HORSELESS AGE · The oldest automotive paper published in the English language has been purchased by The Class Journal Co. Its engineering features, and a part of its circulation, have been merged with AUTOMOTIVE INDUSTRIES

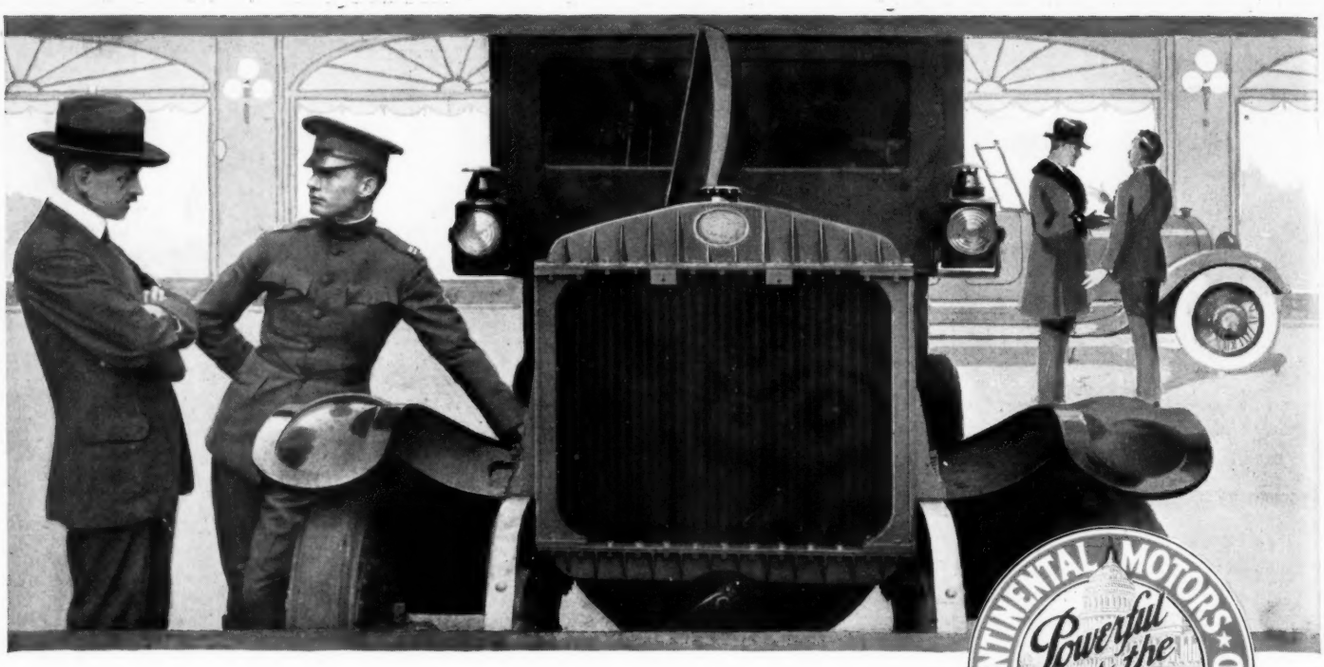
AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

Vol. XXXIX Number [illegible]

PUBLISHED WEEKLY AT 239 WEST 39th STREET
NEW YORK, DECEMBER 12, 1918

Fifteen cents a copy
Three dollars a year

Entered as second-class matter Jan. 2, 1903, at the post-office at New York, N. Y., under the Act of March 3, 1879.



"Red Seal Continental Motors are giving fine service overseas"

There is probably no motor which has had its worth more conclusively demonstrated than the Red Seal Continental Motor.

Here at home, for well over a decade, it has been put to the test in hundreds of thousands of trucks and automobiles—in vehicles of every weight and every type, under every conceivable condition of service. Today it is in use in one or more models of over 160 separate makes of trucks and automobiles.

And now, added to the splendid peace-time record of this famous motor, is its equally splendid showing under the severe test of war service. On the shell-torn roads of France it has proved itself as big as its job.

Past Performance is the surest and most dependable evidence of motor worth. It is only when you select a truck or car on this basis that you are insured against motor experiments of doubtful value.

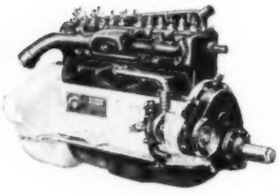
Performance has proved the Red Seal Continental Motor. Its record assures you 100% motor value. Now, as always, this motor is *dependable.*

Look for the Red Seal on the motor in the truck or car you buy—*and be sure.*

CONTINENTAL MOTORS CORPORATION

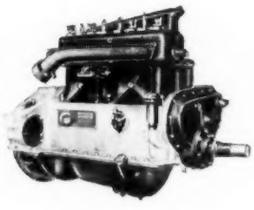
Offices: Detroit, Michigan
Factories: Detroit—Muskegon

Largest Exclusive Motor Manufacturers in the World



America's Standard Passenger Car Motor — Look for the Red Seal Nameplate

America's Standard Truck Motor. Look for the Red Seal Nameplate



Continental Motors

STANDARD POWER FOR TRUCKS AND AUTOMOBILES

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. XXXVIII NEW YORK—THURSDAY, DECEMBER 12, 1918—CHICAGO No. 24

Details of the Liberty Engine

First Mechanical Description, Illustrated with Sectional Drawings, Published in the Periodical Press—Same Engine with Cast Cylinders Used for Tanks

By J. Edward Schipper

IN spite of opposition during the first months of its production, the Liberty aircraft engine lately has been accepted as representing the highest class of engineering design. A strict censorship has been maintained over its details of construction, though the main specifications have been widely known for some time. It is, therefore, with unusual interest that the drawings, published herewith for the first time, will be scanned by engineers whose interest has been aroused but whose connections have not been such as to permit them to view the prints.

The Liberty engine, used in the DeHaviland and other land planes and a great number of seaplanes, is a 12-cylinder V-type with overhead valves and overhead camshaft. It has individual drawn steel cylinders with cylinder dimensions of 5 x 7 in., giving a piston displacement of 1649.34 cu. in. The cylinders are bolted to the upper half of the aluminum crankcase, the two sets making an angle of 45 deg. with each other. The waterjackets are of pressed steel and are welded to the cylinders and at their own seam. An engine in all respects identical with the Liberty aircraft engine, but having cast iron cylinders, is fitted on "tanks," and one of the sectional views printed herewith shows this design.

The valves are mounted in the heads of the cylinders and are inclined at an angle of 15 deg. to the centerline of the cylinder, so that the angle made by the centerlines of the two valves is 30 deg. The intake manifold passes between the two rows of cylinders, and the carbureters in most of the installations are mounted in the V. The entire valve drive is housed above the cylinders and can be readily removed without tearing down the engine.

Released by courtesy of the Bureau of Aircraft Production.

Weight and Output

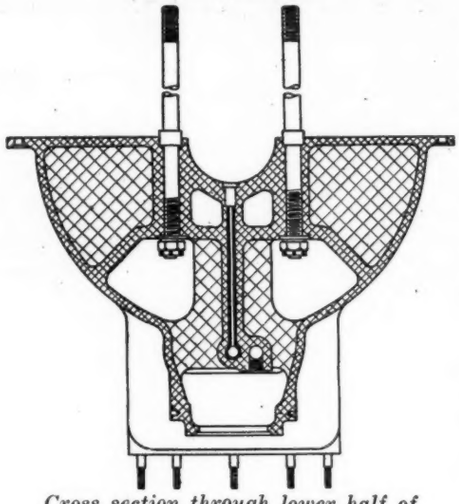
The weight of the Liberty engine is approximately 806 lb. and the brake horsepower developed ranges anywhere between 350 and 400 in the army type with the high compression pistons (18 per cent) and 320 to 340 in the navy type with the low compression pistons (20.5 per cent). The center of gravity of the engine is on the centerline of the transverse section, 10 in. above the top of the engine supports and 21/32 in. toward the distributor end of the engine from the center of the middle bearing bolts. The rated fuel consumption is .54 lb. per brake hp.-hour or 36 gal. per hour with wide open throttle at 1700 r.p.m. Under service conditions, about 30 gal. per hour is a fairly representative consumption. The oil consumption is .03 lb. per hp.-hour or 1½ gal. per hour with wide open throttle at 1700 r.p.m. The horizontal flying speed of the engine is 1700 r.p.m. and the ground speed is 1600 to 1625 r.p.m.

The pistons are of aluminum. There are two designs of pistons used, one for the army type and one for the navy. The army type pistons have a crowned head which gives an 18 per cent compression space. The navy type pistons have a flat head which gives a 20.5 per cent compression space. The pistons are 5 in. in length and have 3 rings of the eccentric type,

all at the top of the piston. These piston rings are assembled with a gap between the ends of the rings not less than .025 in. The pistons weigh 3 lb. 3 oz., and the number of ounces that the pistons weigh over 3 lb. is stamped in the depression on the side of the piston so that in assembly it is possible to pick out pistons of similar weight. The piston casting has an unribbed section and is fairly heavy, the section being ½ in. thick at the head and at the rings and tapering to ¼ in. at the end of the piston skirt.

I-beam connecting rods are used, the connecting rod length being 12 in. between centers. The piston pin is a seamless steel tube, the tube being a drive fit into the bosses on the aluminum piston. The tube is of 1¼ in. outside diameter and is surrounded by a bronze bushing, upon which the upper end of the rod bears. The rod has a solid head and its lower end is either solid or forked, depending on whether it is for the left or right cylinder. The left rods are forked and the right plain. In assembly, the connecting rods are stamped with the serial number of the crankshaft to which they are fitted and also with the number of the cylinder in which they belong. In this way, it is possible to reassemble the Liberty engine and be certain that the rods are returned to the proper cylinders.

The clearance between the lower connecting rod bushings and the crank pin varies from .003 in. to .004 in. The allowable end play is from .010 in. to .020. in. The plain rods have two cap bolts and the forked rods have two for each side, or four.



Cross section through lower half of crankcase

Bearings Between Halves of Case

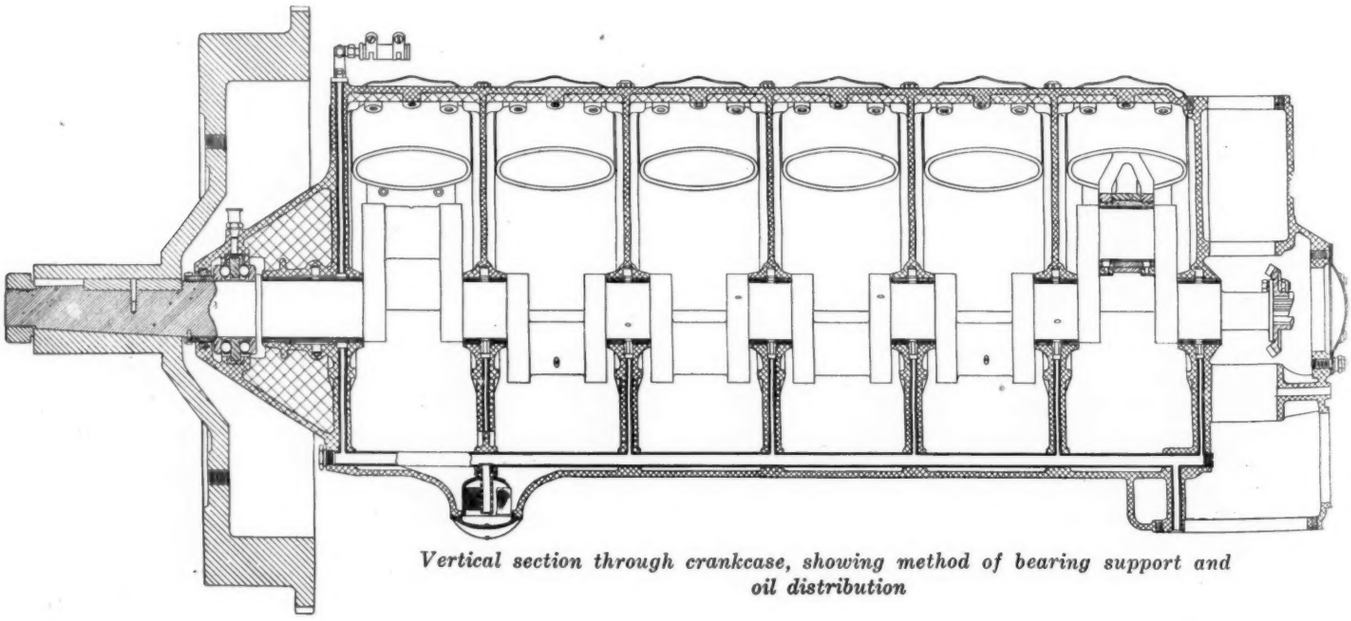
A drop-forged seven-bearing crankshaft, 2⅝ in. in diameter, is used. The shaft carries a propeller hub at its forward end and at the rear end carries a bevel gear for driving the valve mechanism. A double row thrust bearing at the propeller hub end of the crankshaft takes the end thrust on the shaft. The shaft is drilled for oil passage, the openings being drilled through the crank cheeks through the crankpins. The propeller hub is lapped to a fit on the shaft, the end of the crankshaft is tapered and when the hub is fitted on it should be about .001 in. tighter at the large end of the taper than at the small end. In addition to the taper fit, there is a key in the end of the crankshaft to take the propeller hub.

The crankcase is in two pieces, both of which are aluminum castings. The crankshaft bearings are on a line with the split in the crankcase, the lower halves of the crankshaft bearings being held in the lower half of the crankcase and the upper halves in the upper half of the crankcase. The two halves are tied together by long bolts or studs which pass through the upper half of the crankcase, through bosses, the nuts being at the top of the upper half of the case. This gives an accessible construction which is at the same time rigid. A careful joint is made between the two halves of the crankcase in order to secure the desired alignment at the main bearings, the joint being lapped.

Valve Gear

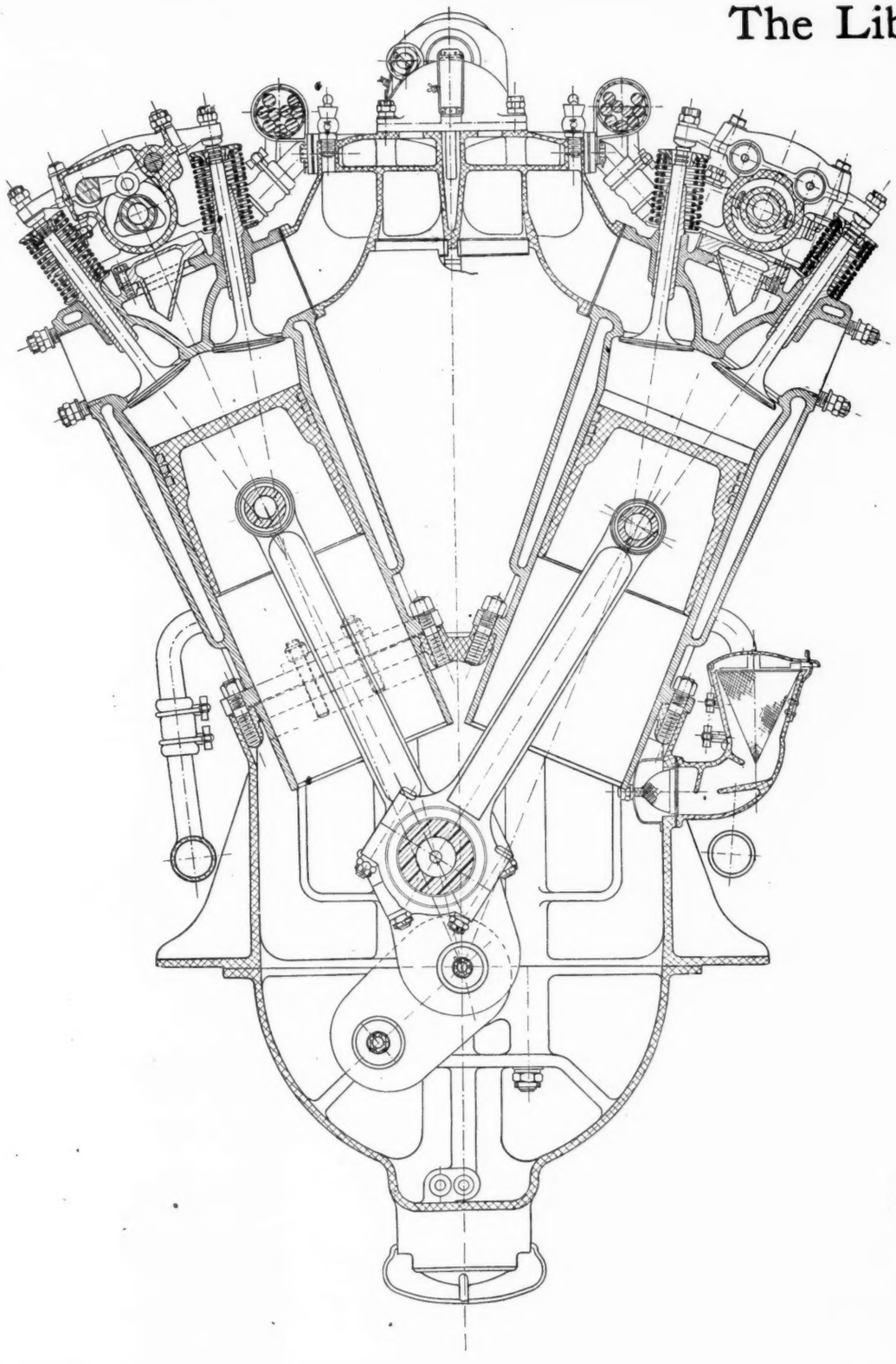
The valve drive is arranged as follows: From the bevel gear on the end of the crankshaft motion is transmitted to a vertical shaft located on the distributor end of the engine, or the end opposite from the propeller hub. This shaft has an intermediate gear which engages with the two cam driving shafts running parallel with the centerlines of the cylinder blocks. The vertical shaft which carries the lower bevel gear and the intermediate gear is carried on a single row ball bearing at the upper end and a single row ball bearing just above the bevel gear at the lower end. The camshaft driving shafts are carried on two single row ball bearings at their lower end and in a bronze bushing at the upper end.

The drive is taken from this point to a bevel gear on the end of the camshaft which actuates the valves. The

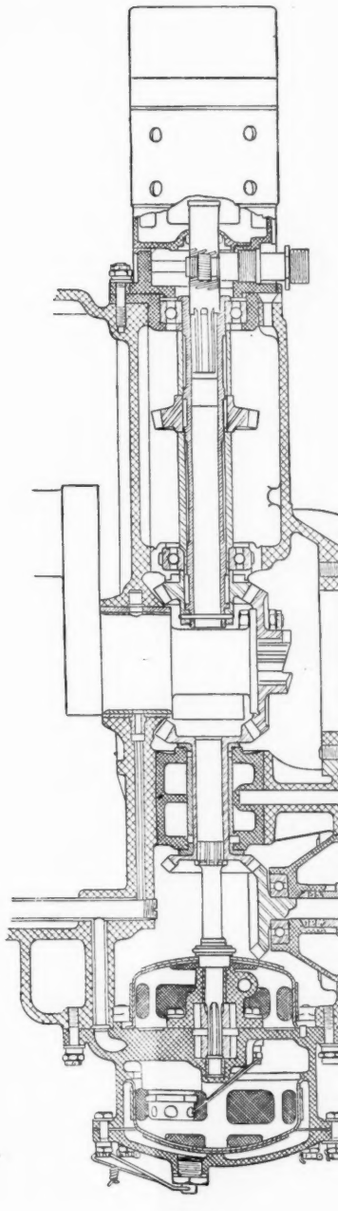


Vertical section through crankcase, showing method of bearing support and oil distribution

The Liberty 12-Cylin

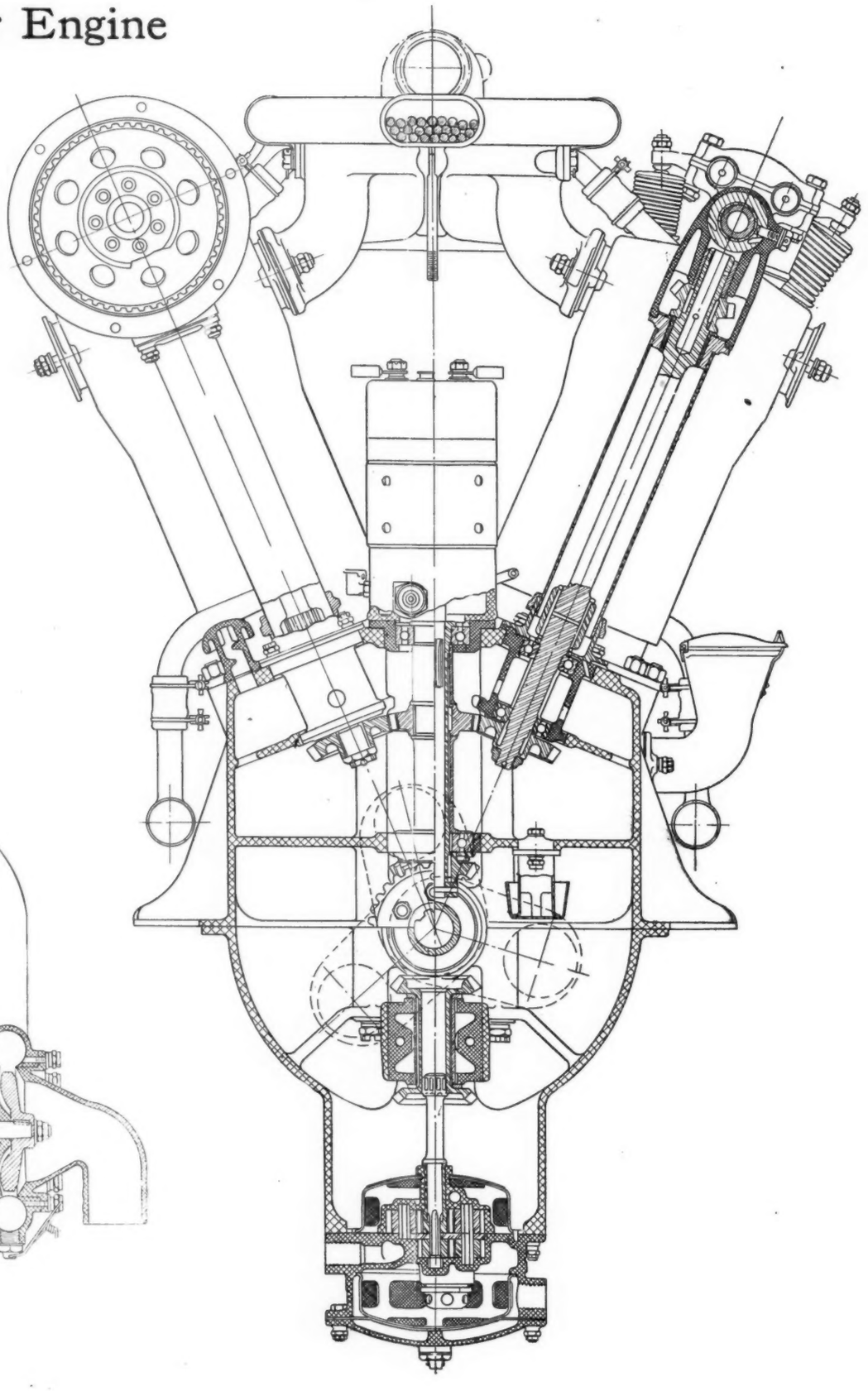


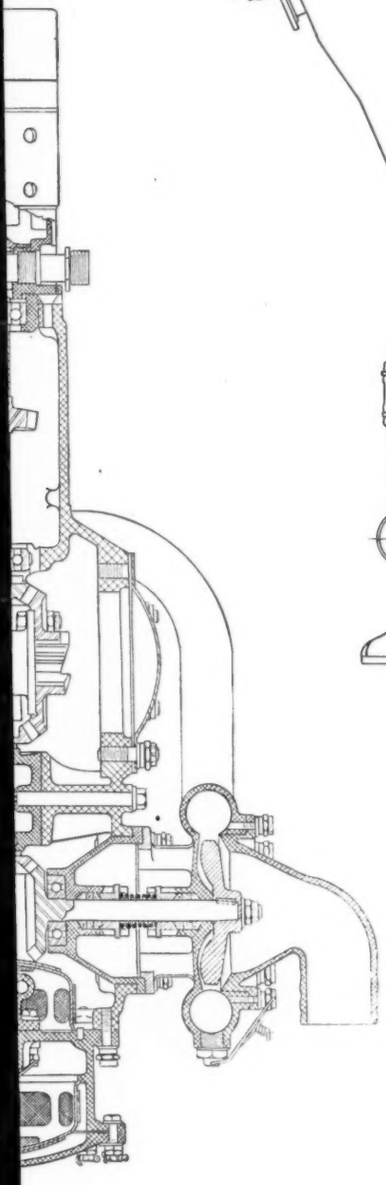
THE view on the left shou the engine with cast-ir cylinders as used on tank while the view on the rig shows it with steel cylinde and sheet metal jackets. B low is shown a section throu the camshaft, oil pump a water pump drives at t forward end of the engine

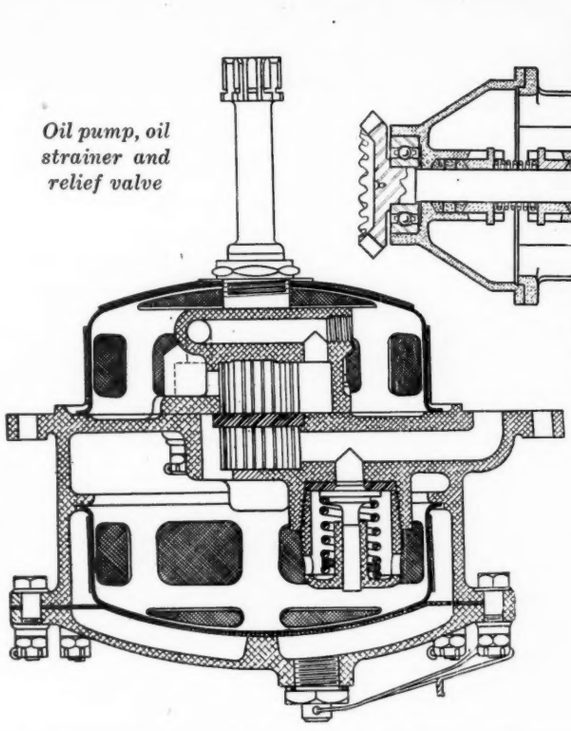


Cylinder Engine

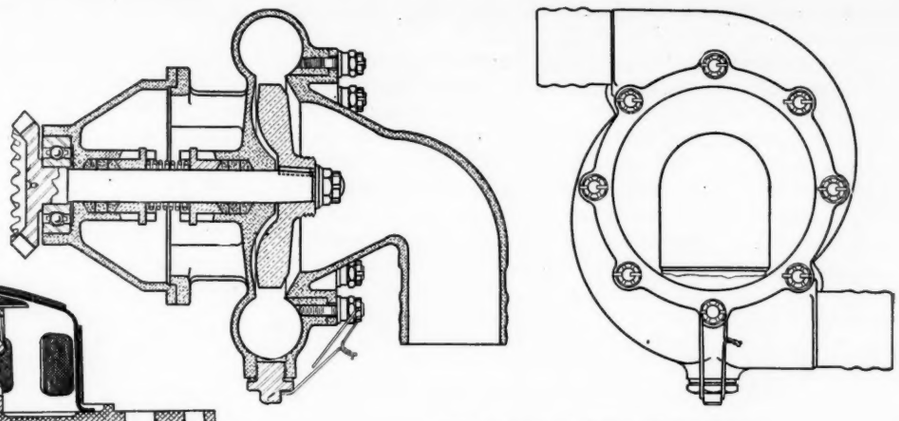
the left shows with cast-iron ed on tanks, on the right teel cylinders jackets. Be- ection through il pump and rives at the f the engine







Oil pump, oil strainer and relief valve



Two views of the water pump

camshaft assembly consists of a camshaft with the cams integral, the camshaft bearing, camshaft driving gear, rocker levers, camshaft housing together with the covers, and also the camshaft driveshaft with the gear, bearings and camshaft driveshaft housing. The two camshaft assemblies for the left and right rows of cylinders are identical and are interchangeable, with the exception of the camshafts themselves and the camshaft housing covers. Each shaft is stamped with a serial number on the soft plug in the end of the camshaft opposite the flanged end. The right hand shafts are marked R and the left hand shafts are marked L. The housing covers are machined in place on the housing.

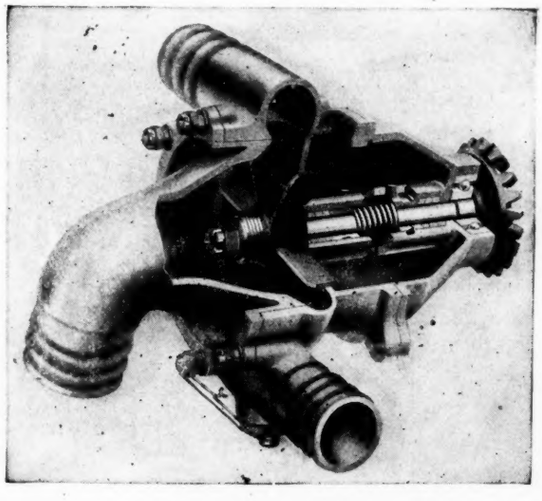
The valves are operated from the camshaft by means of roller cam followers which actuate the rocker shaft and in turn the valve rocker arms. The valve rocker arms bear directly on the valve stems by means of an adjusting bolt directly on the ends of the valve stems. The valves are set into the cylinders on an angle of 15 deg. to the centerline. The valves are the standard mushroom type with 45 deg. seat. The cylinder heads are bushed for the valves and the valve springs are of the double concentric type. The adjustment for the clearance between the end of the valve stem and the valve pushrod is made by turning the screw in the end of the rocker or pushrod and then locking it by means of the nut on the top of the rocker. This nut is locked by a cotter pin and is a castellated type. The clearance on the exhaust valve is .019 to .021 in. and on the inlet, .014 to .016 in.

Ignition System

The distributor is mounted on the ends of the camshaft and arranged to fire 1L, 6R, 5L, 2R, 3L, 4R, 6L, 1R, 2L, 5R, 4L, 3R. The ignition system used on the Liberty 12 is the battery type with two independent breaker and distributor mechanisms, identical in every respect and each one firing all 12 cylinders. These distributors are supplied with electrical energy from two sources. For starting and idling speeds up to 650 r.p.m. current is drawn from the specially constructed four-cell storage battery which has sufficient capacity to ignite the engine at full speed for three hours and is so constructed that it will function properly upside down. The generator builds up so that it takes up the load at 650 r.p.m.

Two main circuit breakers connected in parallel are located in each distributor box and the two circuit breakers are timed to operate simultaneously. Circuit breakers are provided in duplicate as a precautionary measure. There is also an additional circuit breaker to prevent the production of a spark when the engine is turned backward or rocked. The auxiliary breaker is connected in parallel with the other two through a resistance unit which reduces the amount of current flowing through it. The breaker is so timed that it opens slightly before the other two when the engine is turned in a forward direction. When the engine is turned in a backward direction, the main breakers open first and no spark is produced, because the auxiliary breaker permits the current to continue to flow through the coil but in diminished quantity, owing to the resistance unit. The distributor shaft is carried on two ball bearings.

The generator is driven from the same vertical shaft which drives the two camshaft driving shafts, the drive being taken off the upper end of this shaft. The generator rests in a vertical position above this shaft on the centerline of the engine between the two rows of cylinders. By simply removing one flat head screw the entire generator driveshaft assembly can be lifted out. The mesh between the lower generator driveshaft gear and the crank gear is adjusted by pins between the



Sectioned view of water pump

bearing container at the top of the shaft and the crankcase.

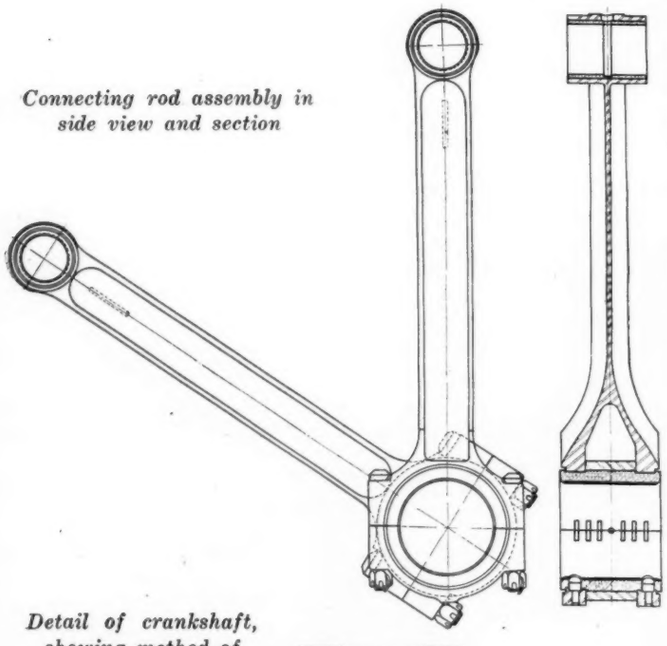
The oil supply for the Liberty engine is carried in a reservoir which is cooled. This reservoir is mounted somewhere in the vicinity of the engine and from it oil is led to the connection on the right side of the oil pump body, which is marked in raised letters Oil In. The oil is filtered at this point through a large-area, fine mesh screen. A delivery pump of the gear type takes the oil after it has passed through the screen and delivers it under pressure to a distributor pipe running the entire length of the crankcase. There is a pressure regulating valve between the pump and the distributing pipe which holds the pressure so that it does not exceed 50 lb. per square inch.

From the distributor pipe there are pipes fitted in the crankcase leading to the main crankshaft bushings. The crankshaft is hollow, and in the center of each main bearing there is a radial hole drilled through the shaft into the hollow center. A passage leads from each hollow main bearing to the adjacent crankpin, which is also hollow. A radial hole is drilled through each crankpin and carries the oil out on the surface of the pin. There are oil grooves and passages in the connecting rod bushings to insure proper lubrication for both the forked and plain connecting rods.

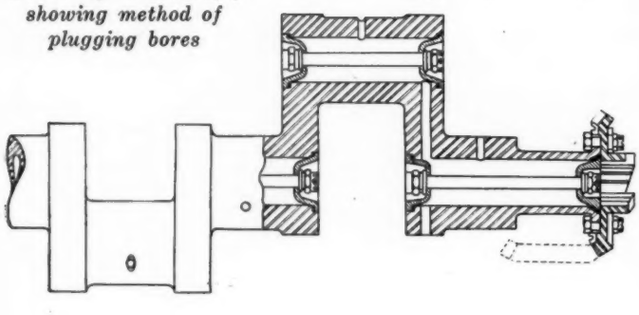
Lubrication of Piston Pins

The oil spray thrown off by centrifugal force from the ends of the connecting rods lubricate the piston pins and cylinder walls. A part of the oil conducted to the crankshaft main bearing at the propeller end of the engine goes through a passage around this bearing and up through pipe leads to the propeller end of the camshaft housings. From the end of the camshaft housing it is led around the end of the camshaft bearing through a passage drilled diametrically through the bearing midway of its length. Once every revolution of the camshaft, a hole drilled through the camshaft into its hollow center registers with the oil passage through the bearing.

Connecting rod assembly in side view and section



Detail of crankshaft, showing method of plugging bores



Lubrication of Valve Mechanism

Thus once every revolution of the camshaft a small quantity of oil is forced into the hollow camshaft. The oil is led through the camshaft and out through holes drilled in it to each camshaft bearing. The excess works out at the ends of these bearings and collects in small pockets to a depth of about ¼ in. The cams, in revolving, dip into this oil and splash it over the cam rollers and into pockets in the rocker level shafts. From these pockets it is led through the hollow rocker shafts to the rocker shaft bearings.

The excess oil eventually finds its way to the gear end of the camshaft housings, over the gears and down the driveshaft housing into a chamber just above the oil pump.

The excess oil thrown off in the crankcase by the connecting rods collects in this same chamber when the engine is inclined so that the propeller end is high. If the propeller end of the engine is low, this oil collects in a small sump or chamber at the propeller end of the crankcase.

Immediately above the oil delivery pump is located an oil return pump consisting of three gears, and driven by the same shaft as the delivery pump. The function of this oil return pump is to draw the excess oil out of the crankcase and return it to the oil reservoir. One section of this pump draws oil from the sump at the propeller end of the crankcase and the other section draws oil from the sump at the distributor end of the crankcase. Both halves of the pump deliver oil to the connection on the left side of the oil pump body marked Oil Out, from which point it returns to the oil reservoir.

Cooling System

Cooling water is circulated through the Liberty engine by means of a centrifugal pump running at one and one-half times engine speed. The capacity of this pump is 100 gal. per min. at 1700 r.p.m. The cooling system from the pump inlet to and including the water outlet header will hold 5½ gal. of water.

The water pump is provided with a single inlet, the outside diameter of which is 2 in., and two outlets each one delivering water to a header, the two headers supplying the right and left hand cylinders respectively. Water is forced into each cylinder jacket in a tangential direction. This construction gives the water a whirling motion inside the jacket and insures uniform cooling.

The water outlet pipe for each cylinder extends inside the jacket to a point very close to the exhaust valve chamber, which assures proper cooling of the exhaust valve. The cooling water then passes through a passage cored in the intake headers. This serves to warm and further vaporize the incoming gas as well as to assist in cooling the water. These passages in the intake headers are connected by two water outlet headers, the final outlet of which has an outside diameter of 2 in.

The water pump is driven from a vertical shaft which takes its drive from the same vertical shaft that drives the camshaft driveshafts and the generator. This shaft extends downward and has a bevel gear which meshes with a bevel gear on the end of the pump shaft, thus accomplishing the drive. The vertical shaft extends downward and terminates in the oil pump, carrying the

driving gear of the gear type of pump utilized for this purpose.

Two duplex Zenith carbureters are used on the 12 cylinder Liberty aircraft engine. This is equivalent to four single carbureters, each one supplying three cylinders of the engine. Each duplex carbureter consists of a single float chamber and a single air inlet joined to two separate and distinct spray nozzles, venturi and idling devices. (As the V type engine is, in a sense, two separate engines, joined together for greater utility, so the Zenith is built in double form for the purpose of supplying each one of these two engines with its exact requirements.) Each of the two barrels of each carbureter is fitted with a throttle valve of the butterfly type. The shafts of the throttles are parallel with the centerline of the engine, or "fore and aft," and are interconnected by means of gear sectors pinned to the throttle shafts and meshing together. The two pairs of throttles are operated simultaneously by a shaft, provided with an adjustment at each end by means of which the pairs may be synchronized. Each duplex carbureter is fitted with an altitude adjustment which affects both barrels equally.

Clearances Used in the Liberty Engine

	Minimum	Maximum	Desired
Crankshaft:			
Diametrical clearance...	0.0025	0.00325	
End play	0.0575	0.0775	
Connecting rods:			
Forked end—			
Diametrical clearance	0.003	0.004	
End play	0.008	0.020	
Plain end—			
Diametrical clearance	0.005	0.0065	
End play	0.004	0.008	
Piston pin:			Select for .001
Fit in rod	0.00025	0.00125	clearance
			Select for light
Fit in piston	0.00025 loose	0.00075 tight	drive fit Top 0.003; Mid. and
Piston rings:			
Fit in grooves	0.00125	0.003	Bot. 0.002
Gap	0.021	0.041	0.030
Piston:			Select for
Fit in cylinder	0.018	0.022	0.020 clearance
Camshaft:			
Diametrical clearance..	0.001	0.003	
End play	0.000	0.004	Min. 0.002
Camshaft upper driveshaft:			
Diametrical clearance—			
Large bushing	0.0005	0.0025	Min. 0.0015
Small bushing	0.0005	0.0025	Min. 0.0015
End play	0.002	0.008	Min. 0.004

	Minimum	Maximum	Desired
Rocker levers:			
Diametrical clearance..	0.00025	0.00175	Min. 0.001
End play	0.005	0.010	0.0075
Valves:			
Fit of stems in guides—			
Diametrical clearance—			
Exhaust valve	0.004	0.0065	0.005
Inlet valve	0.002	0.0045	0.003
Water pump shaft:			
Diametrical clearance..	0.0015	0.0035	Min. 0.0025
End play	0.006	0.010	0.010
Water pump bevel driver:			
Diametrical clearance..	0.001	0.0025	
End play	0.005	0.008	
Oil pump:			
Fit of gears in housing—			Select for
Diametrical clearance	0.001	0.005	0.004 clearance
			Select for
End play	0.002	0.007	0.003 clearance
Tappet gap:			
Exhaust valve	0.019	0.021	
Inlet valve	0.013	0.016	
Breaker gap	0.010	0.013	
Spark plug gap	0.015	0.015	0.015
Regulator:			
Contact gap	0.005	0.007	
Height of pin	0.043	0.045	

Domed piston for high compression model

Sectioned view of engine, illustrating oil distribution

Business Would Be Free to Develop

Desire for Elimination of Burdensome Restriction and Assistance in Building Foreign Trade Keynotes of Reconstruction Conference—Shape 27 Policies for the Guidance of Business

ATLANTIC CITY, Dec. 6—American business has indicated the course it would like to pursue in the work of readjusting from a war to a peace basis. At the Reconstruction Conference of War Service Committees of the Chamber of Commerce of the United States here during four days of this week 5000 representative business men adopted twenty-seven resolutions which are intended to shape and guide the machinery of transition.

Business wants to be free of burdensome restriction. It wants the privilege of holding its own rudder and steering the course that its own experience indicates is the wisest one. And a good part of that course, it is planned, will take American-made goods in American ships to foreign ports.

The convention, representing the allied War Service Committees of some 381 different industries, marks an era in the economic progress of the country. Here were 5000 of the biggest business men of the country gathered together to talk over their past troubles and problems, and to devise ways and means of grasping the trade possibilities that are unfolding with the passing of the world war.

Again and again the delegates heard from those who are in a position to know that business faces a period of great prosperity, that opportunity is knocking at every trade door.

Never before has there been gathered together the business ability and the brains of business that was drawn to the City by the Sea for this four-day conference. Every session was packed. Interest never flagged. Time and again the delegates rose to their feet and cheered when some speaker touched a responsive chord.

The time has come, it is believed, when the need for restrictive measures has passed, and that business is its own best counsel in developing after-the-war trade. As was told in AUTOMOTIVE INDUSTRIES last week, Harry A. Wheeler, president of the congress, uttered the keynote of the conclave:

"Men of business may not be regarded as competent advisors in matters of diplomacy and statecraft as affecting political reconstruction, but as a corollary to this assumption, the diplomat or statesman may not be regarded as a wholly competent advisor in matters of economic reconstruction." The conference cheered that statement.

The matter of foreign trade was an absorbing topic of discussion, and it is significant of the trend of thought that of the twenty-six resolutions unanimously adopted by the conference, nine, or one-third, had to do directly with this subject.

All the resolutions were adopted unanimously. They represent the essence of the American business man's experience during the time the United States was in the war and are intended to be the guiding spirit for American business in the months to come. Here they are:

The Guiding Spirit of American Business

Resolutions Unanimously Adopted by the Reconstruction Conference of the Chamber of Commerce of the United States

1—Cancellation of War Contracts—It is in the public interest that all war orders placed by any contracting agency of the government and accepted in good faith, whether formally and regularly executed or not, should, upon cancellation by such contracting agency, be promptly and equitably adjusted and satisfied as if every formality had been observed, and when so adjusted the amount ascertained to be due by the government should be promptly paid to the end that these funds may be utilized by the industries of the country to speed their transition from a war to a peace basis.

If it should be ascertained that legislation is necessary or desirable to accomplish this end, Congress should forthwith enact such legislation.

Officials dealing with questions of adjustment on account of war orders must necessarily be familiar with all the conditions affecting the order. It will greatly promote expedition and the interests of both the government and private enterprise for the officials who made the contracts to remain in the government service to participate in the readjustments.

2—Surplus Government Supplies—Under date of Nov. 29, 1918, the Secretary of War issued a public statement, *i. e.*, "To prevent too violent dislocation of industry from the standpoint of both employee and employer, accumulation by the War Department of either raw material or finished product will be distributed when and where liquidation of such supplies will least interfere with the return of industry to normal condition." Such action would seem to insure the stability of the industries affected which fully appreciate this liberal position.

Therefore the War Service Committees of American Industries hereby tender to the War Department their services for their respective industries for the purpose of advising with and assisting the War Department in the disposition of such materials.

3—Removal of Restrictions of Industry—It is in the public interest that all war regulations of industry should be revoked and all war restrictions on industry should be removed as speedily as practicable, save such industries as are engaged in the production, preparation or distribution of foods, feeds, and fuel and such last named group of industries

should be freed from war regulations and restrictions as early as consistent with the welfare of this nation and of the Allies.

4—Pivotal Industries—Conditions brought upon us by the European war at its beginning, as well as our national necessities after we entered the war, made it of the highest importance that a number of industries should at once be developed in the United States. Large investments, both of capital and skill, have since been placed in these enterprises. Upon the production of some of them, relatively small in themselves, the continuation of some of our largest industries has depended. Some of the recently developed industries have national importance in fields much broader than the markets of their products; for they may serve, for example, to promote scientific research, which will add to national efficiency, resources, and wealth in many distinct ways.

It becomes essential, therefore, that the government should at once proceed to ascertain the industries which have been developed during the European war and ascertain those the maintenance of which is indispensable for the safety of our industrial structure and our military establishment.

When these pivotal industries have been ascertained, means suitable in view of their nature, and situations should at once be provided for their encouragement and preservation.

5—Industrial Co-operation—The war has demonstrated that through industrial co-operation great economies may be achieved, waste eliminated, and efficiency increased. The nation should not forget, but rather should capitalize these lessons by adapting effective war practices to peace conditions through permitting reasonable co-operation between units of industry under appropriate federal supervision. It is in the public interest that reasonable trade agreements should be entered into, but the failure of the government to either clearly define the dividing line between those agreements which are, and those which are not, in unreasonable restraint of commerce, or to provide an agency to speak for it on application of those proposing to enter into such agreement in effect restricts wholesome co-operation and deprives both industry and the general public of its benefits. The conditions incident to the period of readjustment render it imperative that all obstacles to reasonable co-operation be immediately removed through appropriate legislation.

6—Federal Trade Commission—The Federal Trade Commission was advocated by the President, and was created as an agency to make the administrations of our trust legislation explicit and intelligible, and to provide "the advice, the definite guidance and information" which business enterprises require. The normal importance of the commission's task is now tremendously increased by the imperative need for whole-hearted and sympathetic co-operation between the government and industry especially during the readjustment period and suggests the desirability of the two existing vacancies in the commission's membership being promptly filled with able men of broad business experience and clear vision prepared to assist actively in discharging these tasks along constructive lines.

7—Industrial Relations—The Convention heartily endorses in letter and spirit the principles of the industrial creed so clearly and forcibly stated in the paper read to it Thursday morning by Mr. John D. Rockefeller, Jr., and urges upon all units of industry—where they may not now be employed—the application of such principles. Without approving or rejecting his particular plan or machinery, the principles advanced by Mr. Rockefeller are as follows:

1—Labor and capital are partners, not enemies; their interests are common interests, not opposed, and neither can attain the fullest measure of prosperity at the expense of the other, but only in association with the other.

2—The purpose of industry is quite as much to advance social well-being as material well-being and in the pursuit of that purpose the interests of the community should be carefully considered, the well-being of the employees as respects living and working conditions should be fully guarded, management should be adequately recognized and capital should be justly compensated, and failure in any of these particulars means loss to all.

3—Every man is entitled to an opportunity to earn a living, to fair wages, to reasonable hours of work and proper working conditions, to a decent home, to the opportunity to play, to learn, to worship, and to love, as well as to toil and the responsibility rests as heavily upon industry as upon government or society to see that these conditions and opportunities prevail.

4—Industry, efficiency and initiative, wherever found, should be encouraged and adequately rewarded and indolence, indifference and restriction of production should be discountenanced.

5—The provision of adequate means for uncovering grievances and promptly adjusting them is of fundamental importance to the successful conduct of industry.

6—The most potent measure in bringing about industrial harmony and prosperity is adequate representation of the parties in interest; existing forms of representation should be carefully studied and availed of in so far as they may be found to have merit and adaptable to the peculiar conditions in the various industries.

7—The application of right principles never fails to effect right relations; the letter killeth and the spirit maketh alive; forms are wholly secondary, while attitude and spirit are all important, and only as the parties in industry are animated by the spirit of fair play, justice to all and brotherhood, will any plans which they may mutually work out succeed.

8—That man renders the greatest social service who so co-operates in the organization of industry as to afford to the largest number of men the greatest opportunity for self-development and the enjoyment by every man of those benefits which his own work adds to the wealth of civilization.

8—Relocation of Labor—The conversion of the industry of the country from a peace basis to a war basis involved a general and important dislocation of labor. This movement was gradual. The end of the war involves a much more rapid change in industry; while there will be a great demand for labor to meet the foreign and domestic requirements there may be for a time in special places a temporary condition of unemployment.

In the new relations of industry to labor we conceive it to be incumbent upon the community affected promptly to meet such conditions.

The local chambers of commerce should be able to contribute in an important way in this work.

9—Public Works—The development of public works of every sort, as recommended by the President, should promptly be resumed, in order that opportunities of employment may be created for unskilled labor.

10—Taxation—The cessation of hostilities brings to business interests a feeling of deep concern in the matter of taxation. The problems of readjustment are made more difficult through inequalities in the present law.

We believe, therefore, that in the consideration of amendments to the present act, or the passage of new revenue legislation, attention must be given to the views expressed by organizations of commerce and industry. Ability to pay, inventory values and proper reserves together with careful survey of the amount of revenue required under the new conditions are matters of vital importance to business interests of the nation during this readjustment period.

11—Inventories—We urge that Congress should give careful consideration to the grave menace now facing all industry due to the fact that both raw materials and finished goods are carried in full measure to meet the extraordinary requirements of the government and of the people, and that in large part the stocks have been acquired at abnormal cost and are therefore carried into inventories at inflated values, thereby showing apparent profits which have not been realized, and which probably will never be fully realized. These are largely bookkeeping or "paper" profits, and should not be used as a basis for taxation.

We therefore recommend that any tax law shall provide that during present conditions the taxpayer shall be allowed to make a deduction from his apparent profit by way of a reserve for a subsequent shrinkage in the value of merchandise.

We believe that the interests of the government can be protected against abuse of this privilege by the fixing of a maximum percentage of deduction to be allowed, and by the use of proper methods of inspection and appraisal.

12—Railroads—The Congress of the United States should speedily enact legislation providing for the early return under federal charters to their owners of all railroads now being operated by this government under federal regulations permitting the elimination of wasteful competition, the pooling of equipment, combinations or consolidations through ownership or otherwise in the operation of terminals, and such other practices as will tend to economies without destroying competition in service.

13—Means of Communication—We are opposed to government ownership and operation of telegraphs, telephones, and cables.

14—Merchant Marine—We recommend that the construction of a great Merchant Marine be continued and amplified, and that its operation under American control be kept safe by such legislation as may be necessary to insure its stability and its lasting value to American industries.

15—Port Facilities—The recommendations of the Port and Harbor Facilities Commission of the United States Shipping Board for development of ports are supported. Vessels of foreign register needed for our commerce by sea are attracted to those ports which are best fitted to coal, to load, and to unload cargoes, and thus provide means for a quick turnaround. After ascertaining the port facilities of European countries, and their plans for further development, the commission has recommended that there should be a local port commission at each of the important ports upon our coasts, that upon these commissions there should be representatives of industrial, commercial, and railroad interests centering at the port, that facilities should be installed to meet the needs of the port, and that a zone system should be arranged by which exports and imports would flow through those ports which are within economic transportation distance of the points of origin and destination. There should be co-operation with the Facilities Commission in its task of expanding means which will enhance the position of the United States among maritime nations.

16—Public Utilities—Public utilities have faced difficult problems, which have been accentuated by conditions arising out of war. The development and efficiency of such a utility as local transportation has immediate importance for every community. It is recommended that the Chamber of Commerce of the United States should appoint a committee to investigate and study the question of local transportation as it relates to the control of rates and service, franchises, taxes, the attraction of capital into the business, and such other questions as the committee may find pertinent. Such a committee should report its recommendations to the Board of Directors of the National Chamber, and the board should deal with them in accordance with the established procedure of the chamber.

17—Water Powers—Industrial activity is dependent upon the available supply of power. A bill which would effect the development of hydroelectric power upon waterways and lands which are subject to federal jurisdiction is now before a committee of conference between the two Houses of Congress. It is important in the public interest that Federal legislation on this subject should be enacted without further delay. We accordingly urge that the conference committee arrive at an acceptable form of legislation in season for enactment at this session of Congress.

18—International Reconstruction—In war we have made common cause with the Allies. We should likewise make common cause with them in seeking the solution of the immediate problems of reconstruction which they face, because of the efforts they put forth in the war. These problems peculiarly depend for their solution upon commerce.

Raw materials and industrial equipment which we possess the Allies urgently require, that they may reconstitute their economic life. We should deal generously with them in sharing these resources.

In order that we may share our materials with the Allies, we must also provide them with credits through which they may make the necessary payments.

Our ocean tonnage must supply our troops overseas and help to provision the inhabitants of war-devastated regions. The part of our ocean tonnage not required for these paramount needs, and vessels of associated countries which are in a similar situation, should be entered into the common service of all nations. This common service should secure to all nations their immediate needs of food, raw materials, and transport for their products.

19—European Commission—The business men of the United States, having devoted their energies and resources toward the winning of the war, regardless of sacrifices or burdens, in support of the principles for which this country fought, appreciate the necessity of continuance of unremitting effort in order that the world may be restored to normal conditions as quickly as possible and the blessings of peace brought to all peoples.

In the accomplishment of these results the highest efficiency of the great commercial and industrial powers of our own country and that of the Allied nations will be developed only through co-operative effort and common counsel.

In order, therefore, to contribute to the fullest toward the prompt solution of the problem presented, the Chamber of Commerce of the United States is requested to enlist the co-operation of national bodies devoted to the extension and promotion of American commerce, and particularly foreign trade, in the appointment of a commission representative of American business, which shall proceed without delay to Europe and establish machinery for the following purposes:

A—To study at first hand the reconstruction needs of European countries in conjunction with business men of these nations in order to advise the business men of the United States as to how they may be most helpful in meeting the necessities of Europe and caring for the interests of American industry and commerce.

B—To be available to the Peace delegates of the United States for any needed information which they may be able to present or for any other aid which may be given by the business men of the United States through the medium of such a commission.

The Chamber of Commerce of the United States also is requested to appoint members of the commission to represent the business men of the United States at the forthcoming meeting of the Permanent Committees of the International Congress of Chambers of Commerce.

20—Markets for Foreign Trade—We strongly urge upon our government the vital necessity of encouraging and developing our foreign trade through all appropriate means possible, in order that the production of industry may afford employment to wage earners and prosperity to the nation.

21—South American Relations—It has long been the policy of this nation to cultivate relations of close sympathy with the nations of the western hemisphere as expressed in the Monroe Doctrine. We believe that these relations should be supplemented and strengthened by a vigorous development of our commerce and financial associations with our neighbors of North and South America.

The government's control of shipping should be brought to the accomplishment of this purpose as soon as it is consistent with other urgent needs, and the work of the Pan-American Union should be continued and broadened in scope.

22—Property Rights in Mexico—By provisions in a constitution adopted while much of the country was engaged in civil strife, and through subsequent legislation, Mexican authorities have threatened rights acquired by Americans in good faith, especially in minerals, including petroleum. Against threatened confiscation the American Government made formal protests. The attitude taken by the American Government is heartily commended as in accordance with obvious justice.

23—Education for Foreign Commerce—In the larger opportunities which are to be opened to American business men to play a part in the international commerce of the world the need will be felt for more men who are trained to a knowledge and understanding of the language, the business methods and the habits of thought of foreign lands. Complete success can only come to those who succeed in putting themselves into full accord and sympathy with the peoples with whom they are to deal.

We urge upon our industries that they take steps to provide opportunities to young men to obtain an education in the practices of overseas commerce and finance and in the practical use of foreign languages.

We call the attention of the various departments of government and of educators to the importance of this matter and ask that special efforts be made to supplement the valuable work already done and to open up every facility to the furtherance of a successful prosecution of this educational work.

24—Forest Products Laboratories—The Forest Products Laboratories, of the United States Forest Service, have rendered valuable service through scientific investigation of the physical properties of American woods and their adaptability for structural, industrial and ornamental usage. It is of great importance to American industry that the government should extend and adequately maintain the work of the Forest Products Laboratories.

25—Cost Accounting—It is the sense of this Convention that uniform cost accounting should be adopted by industries.

26—Council and Executive Committee—Your Committee has given serious consideration to the suggestion that following this conference an executive committee should be appointed to relate the efforts of the various war service committees, keep them continuously informed on matters of common interest, and co-ordinate their work on national problems.

It is the conviction of your Committee that it is absolutely essential to the stability of business in this country and the prompt and wise solution of our problems that the war service committees should continue their work in co-operation with government agencies and now turn their attention to the new questions with which the country is faced. We therefore recommend that all present committees so represent their industries and that an Executive Committee be named with as little delay as possible.

At the meeting of the chairmen of the war service committees held in Washington, D. C., on Dec. 12, 1917, the Chamber of Commerce of the United States was requested to undertake the organization of committees in all the industries not then represented.

By vote this conference also requested that the War Service Executive Committee of the National Chamber should act as the executive committee of these committees of the industries.

At the meeting in December, 1917, it was suggested to the War Service Executive Committee of the Chamber of Commerce of the United States that as soon as practicable a council be appointed representative of all the industries which would act as advisory to the War Service Executive Committee.

It is believed that the time has now arrived when such a council should be formed and it is recommended that this council be composed of the chairmen of the war service committees.

The Board of Directors of the National Chamber has stated that if it be the desire of this Convention, the Chamber will be glad to reconstitute its War Service Executive Committee and have it continue to serve in the same capacity in which it has acted during the war, directing attention particularly to the problem of reconstruction affecting all industries.

In this direction the Chamber would wish to make the co-operation of these committees on a national scale as effective as possible, and it will continue to publish such bulletins and reports as may be necessary for their benefit, and place at their service the facilities of its general headquarters in Washington and its branch offices.

It is the opinion of your Committee that this Conference should immediately take advantage of the willingness of the Chamber to undertake this responsibility, and it therefore presents the following resolutions:

Resolved, That this conference requests the Chamber of Commerce of the United States to appoint a War Service Executive Committee of such number as may seem best to relate the efforts of all of the War Service Committees, and to aid in making effective the action of this conference and pledges its assistance to the National Chamber in securing the service on the Committee of such leaders of industry as may be called to act.

Resolved, That the chairmen of the War Service Committees of the industries shall constitute a Council to be advisory to the War Service Executive Committee, and to meet from time to time at the call of the Executive Committee or any twenty-five members of the Council.

Resolved, That new War Service Committees representing industries not now organized may be recognized by the War Service Executive Committee or by the Council.

27—National Trade Associations—The experiences of the war have clearly demonstrated the value of national trade organizations and their service to the country as well as to industry.

This conference heartily approves the plan of organizing each industry in the country in a representative national trade association and expresses the belief that every manufacturer, jobber and producer of raw materials should be a member of the national organization in his trade and cordially support it in its work.

British FE2B Pusher Fighting Biplane

The FE2B biplane is one of the oldest types used by the British army, having been first brought out in December, 1915, and remaining in use up to the end of the war. It is a two-seater machine fitted with 160-hp. Beardmore engine and equipped with two Lewis machine guns. In addition it is designed to carry 300 lb. of bombs. The machine has a total weight of 2827 lb., its ceiling is 11,000 ft. and its endurance at 10,000 ft., including the climb, 3½ hr. At ground level it is capable of developing a speed of 83 m.p.h. and at 10,000 ft. 76 m.p.h. The machine is a product of the Royal Aircraft Factory

Principles of Tractor Radiator Design

Derivation of Some Simple Equations Showing the Dependence of Radiator Capacity on Temperatures, Rates of Flow and Inherent Characteristics—Advantages of Thermo-Syphon Circulation in Tractor Work

By E. Goldberger

Efficiency Engineer, Packard Motor Car Co.;
Formerly Assistant Chief Engineer, Holt Mfg. Co.

THERMO-SYPHON cooling is more advantageous in a tractor than in a truck or automobile. It does away with the water pump and it gives substantially the same effect as thermostatic control in connection with pump circulation.

Counterflow radiator systems give better results than direct flow systems, because whereas in the direct flow system the temperature in a given horizontal plane is nearly constant in all rows of tubes, in the counterflow system the temperature decreases toward the front of the radiator, allowing the hottest water to come in contact with air that has already been warmed up, while the coolest water comes in contact with fresh, cold air. The result is a greater drop in temperature.

The variable which affects the cooling capacity least is the rate of water circulation. The amount of water carried in the tank can be disregarded from the standpoint of cooling capacity, as is evidenced by the fact that adding water tank capacity to an unsuccessful radiator only delays the time when the water begins to boil.

These conclusions are all reached by calculating the heat flow from basic principles. The results in practice bear out the conclusions arrived at by calculation, and by means of the formula given it is possible to accurately calculate the results that will be obtained from any given radiator having a predetermined cooling coefficient. The coefficient of cooling capacity K will differ with the type of radiator, and some experiments have been made for determining this coefficient, notably by the Holt Mfg. Co., Peoria, Ill. The method of carrying out these experiments and of making the calculations necessary to arrive at a working formula are outlined below.

The symbols used for the variables in these radiator calculations are as follows:

H, B.t.u./min., heat dispersed by radiator per min.
W, lb./min., water circulated per min.
A, cu. ft./min., air circulated per min.
T_{w_1}, T_{w_2}, deg. Fahr., average temperature of water on entering and leaving the radiator.
T_{a_1}, T_{a_2}, deg. Fahr., average temperature of the air entering and leaving the radiator.
v, ft./min., average velocity of air just in front of radiator.
K, B.t.u./sq. ft./deg. Fahr./min., specific cooling capacity of the radiator or the B.t.u. carried away per sq. ft. of radiator surface in one minute, when the difference in the average temperature between the water and the air is 1 deg. Fahr.
S, sq. ft., total radiator surface in contact with the air.

The formulæ used in this discussion are given below, and are numbered for reference.

$$H_w = W(T_{w_1} - T_{w_2}) \tag{1}$$

$$H_a = 0.017A(T_{a_2} - T_{a_1}) \tag{2}$$

$$H_s = SK\frac{T_{w_1} + T_{w_2}}{2} - \frac{T_{a_1} + T_{a_2}}{2} \tag{3}$$

$$H_w = H_a = H_s = H \tag{4}$$

$$H = \frac{T_{w_1} - T_{a_1}}{\frac{1}{SK} + \frac{1}{2W} + \frac{1}{0.034A}} \tag{5}$$

The above formulæ are assumed in the discussion which follows and are the basis for all the conclusions reached. Those who wish to follow up their derivations will find them appended to this article.

I shall not discuss the problem as to how large H should be in order to permit of cooling a certain size and make of gasoline or kerosene engine; all we care to know at present is how many B.t.u. per minute a radiator can transmit to the air. From the form of equation (5) we can draw some very important conclusions, as follows:

The radiator is only one of the elements affecting the results, and not the most important one either; other elements under our control, such as the quantities of water and air circulated per minute are just as vital as the radiator itself.

Water Tank Capacity

The amount of water carried in the tank can be disregarded from the standpoint of cooling capacity, and is not a factor in the above equations. This conclusion is not new to many engineers. However, a few years ago one of the most successful tractor concerns persisted in building its water tanks larger and larger in a vain effort to overcome excessive heating of its engines.

To be sure, if we start the engine when the water in the tank is cold, it may take 30 min. before it reaches a constant temperature, and if we double the tank capacity it may take one hour before that condition is reached; if we stop the engine every now and then and give the water a chance to cool down, as in an automobile or a truck, we avoid the overheating, but a tractor that has to stop every hour to take on cold water or wait to cool off is a failure.

Extreme Summer Conditions

We can also see from equation (5) that after a decision has been made as to the type and size of radiator (S), quantity of water circulated by the pump (W) and quantity of air circulated (A and K), all of which factors are controlled by the designer, the heat carried away will be proportional to the difference between the highest water temperature and the atmospheric temperature (which can easily be measured). Furthermore, if we expect the tractor to work under the extreme summer conditions of our climate, the atmospheric temperature must be taken at 100 deg. Fahr. and the water temperature somewhat

lower than 212 deg. Fahr. Knowing the features of the cooling system, we can easily foretell whether it will work or not under extreme summer conditions of any climate.

There is, nevertheless, the coefficient K, which has to be determined, and this can only be done by field or laboratory test (once for all) with every type of radiator, varying the velocity of the cooling air.

Such experiments for tractor radiators were undertaken (for the first time as far as the writer knows) by the Holt Mfg. Co., of Peoria, Ill., in 1915.

A water meter was built into the circuit between the radiator and engine, and temperatures were measured at the inlet and outlet of the water, to and from the radiator. These quantities being known, H can easily be figured from equation (1). However, care must be taken to determine the average temperatures by taking observations after the motor has reached a constant working temperature; the quantity of water circulated per minute will not necessarily be the same when the water meter is removed from the circuit.

Engine Measurements

Measurements made with the engine running steadily at full load will be more accurate than measurements at half load or less, since in the former case the temperature range of the water is greater, and any error made in the observations has a lesser influence on the error in the final results.

To solve equation (2) the quantity of air can be arrived at by measuring the air velocity with an anemometer placed a few inches in front of the radiator (in order to avoid obstruction of the air current) and multiplying it by the section of the air passage. It is a good plan to build a hood or shroud in front of the radiator, from 6 to 10 in. deep, of the same section as the radiator air passage, as this insures greater accuracy in the measurement of air flow. It is easy to measure the temperature of the air drawn in, but it is very difficult to obtain a correct average of the air temperatures as measured behind the radiator. These temperatures naturally decrease toward the bottom of the radiator, and they are not constant on a given level, so the best that can be done, if it is desired to avoid the use of special apparatus, is to figure T_{a_1} from equation (2), H being known from equation (1) and the other variables measured.

By substituting in (3) all variables as measured or calculated, the correct value of coefficient K is found. Fig. 2 shows that this coefficient increases directly with the air velocity, with practically all types of radiator, although there are great differences between the values of K for different types.

Example from Practice

Let us now figure out the following example:

A radiator is built with 28 sections of 3 tubes each, 26.35 in. long, of which 23.75 in. is covered with spirally wound fins. The total cooling surface figures out to $S = 156$ sq. ft. Other factors may be assumed as follows:

$W = 270$ lb./min.	Water per min.
$A = 8500$ cu. ft./min.	Air per min.
$v_1 = 1480$ ft./min.	Air velocity with tractor stationary
$v_2 = 100$ ft./min.	Average increase in air velocity due to tractor speed
$v = v_1 + v_2 = 1600$ ft./min.	Corrected air velocity for traveling tractor
$K = 0.255$ B.t.u./sq. ft. deg. Fahr./min.	

Under extreme summer conditions this radiator equipped with water pump and fan will radiate:

$$H = \frac{205 - 100}{\frac{1}{156 \times 0.255} + \frac{1}{2 \times 270} + \frac{1}{0.034 \times 8500}} =$$

$$\frac{105}{\frac{2.500}{100} + \frac{1.85}{100} + \frac{.346}{100}} = \frac{10{,}500}{3.031} = 3450 \text{ B.t.u./min.}$$

On the basis of 80 B.t.u./hp./min. to be radiated, this radiator would take care of a $\frac{3450}{80} = 42$-hp. tractor engine.

Comparative Effect of Variables

In order to see to what extent either one of the fundamental variables (S, W, A) affects the quantity of heat radiated, let us increase the value of either S, W, or A by 20 per cent.

	S	W	A	K	H	Per Cent H
1.....	156	270	8,500	0.255	3,450	100
2.....	187	270	8,500	0.220	3,570	103.5
3.....	156	325	8,500	0.255	3,500	101.5
4.....	156	270	10,200	0.300	4,020	116.5

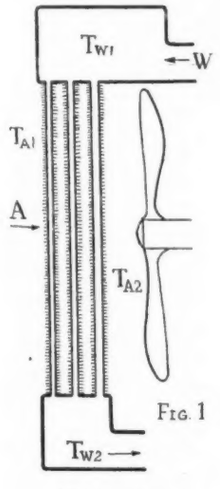


FIG. 1

Illustrating notation

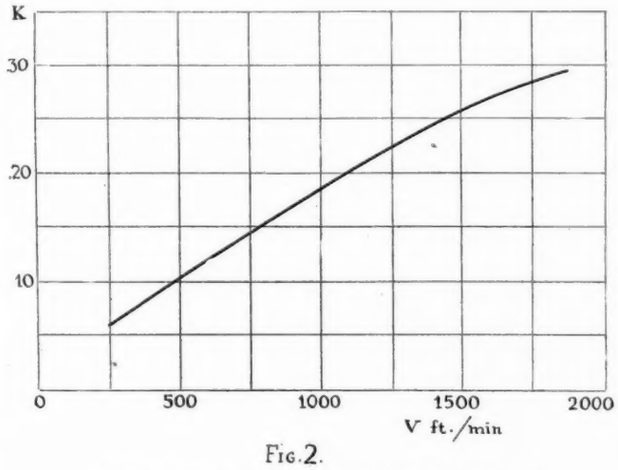


FIG. 2.

Variation of radiator coefficient K with air velocity

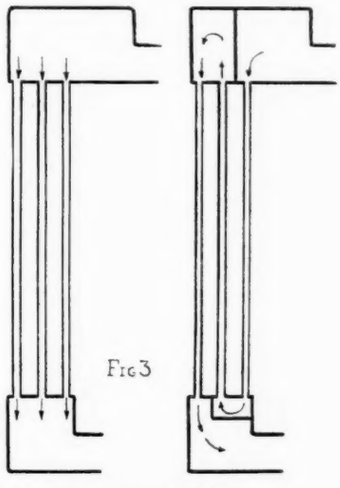


FIG 3

Direct and counterflow circulation systems

It will be easily seen that the most important element of a cooling system is by no means the radiating surface but the quantity of air drawn in; it is therefore permissible to say that if the quantity of air passed through the radiator is increased considerably, the cooling surface can be decreased until the radiator manufacturer is left very little to do. This, however, would not be economical.

Thermostat and Thermo-syphon

The variable which affects the cooling capacity of the above system least is the quantity of water circulated per min. Yet, as soon as the water circulation is stopped or considerably reduced the cooling system will not transmit any heat. Upon this principle is based the thermostat used so extensively in automobiles. Making an exception of thermostatically controlled systems, the water circulation can be reduced considerably, if the air circulation is slightly increased, yet the cooling system will be just as efficient as before. This leads us to the question of the advisability of using the thermo-syphon system of water circulation in tractors.

The circulation of air through the radiators of automobiles and trucks is due chiefly to the comparatively high speed on the road, while the fan is supposed to take care of the reduced need for cooling when the car is stopped and the motor runs idle; in this case, if in addition to the reduced air supply the water supply were small, the system would not be able to cool the engine even at that reduced load, and much less when a truck is running at low speed with a full load. Therefore most of the automobiles have a forced, large water circulation. Conditions are entirely different on a tractor. The fan is supposed to furnish all or nearly all of the air necessary for cooling, and if the thermo-syphon system is built to work satisfactorily at full load, it will work just as satisfactorily when the tractor is not traveling at all. The thermo-syphon system is, therefore, more advantageous in a tractor than in a truck or automobile; it does away with the water pump and gives the same effect as thermostatic control.

Specific Cooling Capacity

Special attention must be called to the fact that what distinguishes a good radiator from a poor one is the value of K, the specific cooling capacity at varying air velocities; this curve is the characteristic of the radiator. Radiators should not be bought per pound or per square foot or per foot, but per unit of cooling capacity.

The radiator above referred to and its specific cooling capacity (K curve) did not prove entirely satisfactory, and the new size of tractor manufactured by the concern is fitted with a honeycomb radiator.

Direct and Counterflow Radiator System

Even with a given type, size and number of tubes, etc., the results can be changed by varying their distribution. Experiments were made with a radiator having its tubes arranged in three rows. The first time, the water passed downward through all of them, while the second time the section headers were cast so that the water passed downward in the tubes nearest the engine, upward in the middle ones and downward again in the front ones. The specific cooling capacity K was increased and the cooling effect was generally improved, the explanation being as follows:

In the first case the water temperature in the same horizontal plane is nearly constant in all three rows of tubes, while in the second case the temperatures decrease toward the front; i.e., the hottest water comes in contact with the air that has already been warmed up somewhat, but the coolest water in the front rows comes in contact with the fresh cold air. The result is a greater drop in the temperature. This principle has been applied successfully to steam engine condensers for a long time, and because the air flow and water flow have opposite directions it is called the counterflow system.

With tubular types of radiator based on either the direct or counterflow system, the cooling capacity of the front tubes is the highest, and the capacity of succeeding rows decreases step by step.

Number of Rows in Tubular Radiators

This is due to the fact that the temperature of the cooling air increases as it penetrates the radiator. Therefore, the average cooling capacity (K) of the whole radiator is smaller the greater the number of rows. Whether three or four or five rows are the most economical, depends upon the type of tubes and available frontal area.

The equations given above are based on the laws of physics and have been verified by test. The physical laws involved are as follows:

a. The rise or drop in the temperature of liquids is proportional to the heat absorbed or lost. Thus the temperature of 1 lb. of water increases 1 deg. Fahr. for every 1 B.t.u. absorbed; hence for our case:

$$H_w = W(T_{w_1} - T_{w_2})$$

b. The same law applies for the air, the temperature of 1 cu. ft. of air increasing 1 deg. Fahr. for every 0.017 B.t.u. absorbed, hence:

$$H_a = 0.017A(T_{a_2} - T_{a_1})$$

c. When a fan is used to move the air, as in the case of radiators, all heat is transmitted from the water to the radiator wall, then through the wall and finally is given up by the wall to the air and dispersed by convection. Thus the amount of heat that passes through the wall increases in direct proportion to the cooling surface and to the difference in temperature between the water (inside) and the air (outside).

The average air temperature is $\frac{T_{a_1} + T_{a_2}}{2}$

The average water temperature is $\frac{T_{w_1} + T_{w_2}}{2}$

Hence the average difference is

$$\frac{T_{w_1} + T_{w_2}}{2} - \frac{T_{a_1} + T_{a_2}}{2}$$

In order to express the heat that passes through the radiator walls in B.t.u. per min., the product of radiator surface and average temperature difference must be multiplied by a coefficient K, which expresses the amount of heat transmitted to the air in one min. per sq. ft. of cooling surface and for 1 deg. Fahr. difference in temperature. The equation then reads:

$$H_s = SK\left(\frac{T_{w_1} + T_{w_2}}{2} - \frac{T_{a_1} + T_{a_2}}{2}\right)$$

This coefficient varies with the type of radiator, but once the type is determined, it is found to be independent of either temperature of air or water, or the rate of water circulation, the only factor affecting it being the speed of the cooling air, as will be described later.

d. Since the amount of heat lost by the water (H_w) is the same as that passing through the radiator walls (H_s) and also the same as that finally carried away by the air (H_a), we can write: $H_w = H_a = H_s = H$.

e. In the following formulas eliminations and substitutions will be made in order to express the quantity of heat in terms of such variables as are under our control. Eliminating T_{w_2} and T_{a_2} from (1) and (2) we find:

$$T_{w_2} = T_{w_1} - \frac{H}{W}$$

$$T_{a_2} = T_{a_1} + \frac{H}{0.017A}$$

and substituting these values in (3) we get:

$$H = SK\left(\frac{T_{w_1} + T_{w_1} - \frac{H}{W}}{2} - \frac{T_{a_1} + T_{a_1} + \frac{H}{0.017}}{2}\right)$$

$$= SK\left(T_{w_1} - \frac{H}{2W} - T_{a_1} - \frac{H}{0.034A}\right)$$

$$\frac{H}{SK} = T_{w_1} - T_{a_1} - H\left(\frac{1}{2W} + \frac{1}{0.034A}\right)$$

$$H\left(\frac{1}{SK} + \frac{1}{2W} + \frac{1}{0.034A}\right) = T_{w_1} - T_{a_1}$$

$$h = \frac{T_{w_1} - T_{a_1}}{\frac{1}{SK} + \frac{1}{2W} + \frac{1}{0.034A}} \qquad (5)$$

This formula can be transformed to apply to 1 hp. developed by the engine by denoting by h, s, w and a the heat radiated, radiator surface, quantity of water and quantity of air per horsepower respectively. The formula will then read

$$h = \frac{T_{w_1} - T_{a_1}}{\frac{1}{sK} + \frac{1}{2w} + \frac{1}{0.034a}}$$

This formula can be easily transformed to give the radiator surface s as a function of all other variables.

An expression for the radiator frontal area has been derived by A. B. Modine, of the Modine Radiator Co., and was given by him in a paper read at an S. A. E. Minneapolis Section meeting. The expression is derived from equation (2) above, and does not take into consideration the influence of the rate of water circulation and its temperatures. Every one of these variables affects the difference between the air temperatures in a way which cannot be expressed easily, except through the above equations.

—

Counting Engine Parts

Editor AUTOMOTIVE INDUSTRIES:

I have read with interest the article on the Hispano-Suiza motor. It seems to me that the introductory paragraph is a slight indulgence in "sharp practice." I quote the following: "It is said that the Mercedes aircraft engine has approximately 900 parts to 400 in the Hispano-Suiza." This sentence does not say that 900 parts is approximately the total pieces composing the Mercedes, or that 400 pieces is the total making up the Hispano-Suiza motor. But how many will read this sentence in terms of total instead of a ratio?

I will assume that reference is made to the Mercedes six-cylinder dual or four-valve motor, and to the Hispano-Suiza eight, as per illustration.

It is possible that I do not know how to count parts of a motor; therefore, I will state my idea on this matter. Motor parts must include, in addition to the special parts, all screws, studs, nuts, lockwashers, cotterpins and gaskets. We will count the connecting-rod staff as one part, for the benefit of the pressed steel rodmaker as an encouragement to him. I think it proper to exclude all accessories, except the radiator fan, for the reason of making a fair comparison between the gear-driven and the belt-driven fan.

Let us now count a few of the parts of the Hispano-Suiza motor: Bolting the cylinders to the crankcase, it appears from the illustration, requires eight studs per cylinder.

For 8 cylinders equal a total of	64
Lock washers or cotterpins	64
Nuts	64
Cylinders	8
Valve assembly (5 pieces), 16 assemblies	90
Connecting-rod and piston assembly per units in pairs equal	156
Total	426

You will admit that the above items are only a starter as compared to the total parts actually required to make a complete assembly of the Hispano-Suiza motor.

My interest in this article is due to the fact that I expect to soon announce a twelve-cylinder design, on aircraft lines, that requires about 800 pieces to make a complete assembly, counting as above stated.

C. M. MOHLER.

—

Book Review

The Gasoline Automobile. Volume 3, Electrical Equipment. By P. M. Heldt. P. M. Heldt, Nyack, N. Y.

The third volume of the Gasoline Automobile, dealing with the electrical equipment, follows closely the style of the two previous volumes, which dealt with the engine and chassis construction, development and design. In the present volume, all sorts of ignition, starting, lighting and other electrical equipments are gone into in the most minute details, and not only the action and operation of the device is described, but also a considerable amount of engineering information, formulas, shorts, etc.

Like the other two volumes in the set, the present volume was written mainly to meet the needs of automotive engineers and students of the science and art of automotive engineering. However, the third volume differs somewhat from the two preceding ones both in method of treatment and in the scope of its appeal. There are in the country at present a large number of managers and employees of garages and service stations who have to take care of electrical apparatus, and it has been the author's aim to incorporate in the book such material as is required to make it serve them as a practical hand-book of their trade.

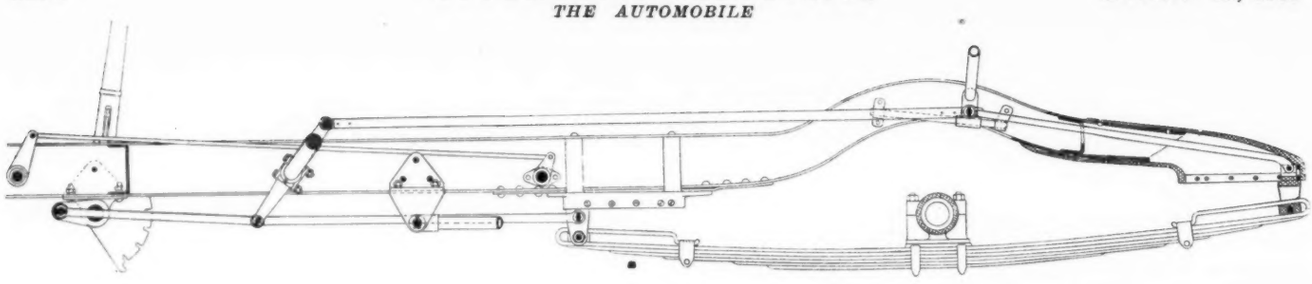
What will probably appeal most to the reader, who is connected with a garage or service station, are the sections on the maintenance, care and repair of the different items of electrical equipment. In dealing with these subjects the aim has been to make the information given of as wide application as possible, and always to explain the underlying reasons for defective operation observed and for remedies applied.

Much of the material in this book was originally prepared and run as a series of articles in *Horseless Age* during 1914 and 1915. The publishing rights have now been secured, and the material has been revised and brought up-to-date.

—

Paper Driving Belts

PAPER substitute driving belts are now being introduced into German workshops, and some particulars of them are given in the *Bulletin des Usines de Guerre* for July 1. The paper is cut into narrow bands, which are then spun. The belts are made by weaving or braiding. Woven-paper belts are of two kinds—paper fabric belts and paper thread belts, the former type being the most frequently used. The fabric is first cut into bands 40 m. long, which are subsequently made up according to the desired width and thickness. A core of strengthening material is interposed, either cotton or sheet metal, though more recently these cores have consisted of paper thread and metal wires interwoven. The core is surrounded with the paper strips and the whole sewn with strong thread. Belts so prepared are said to be very flexible and to wear satisfactorily. Woven paper belts have a tensile strength of from 100 to 125 kilos. per centimeter of width.



Houdaille Brings Out Adjustable Car Suspension

Inventor of Shock Absorber Fame Turns His Attention to the Spring Suspension Problem—By Moving the Points of Attachment of the Springs to the Car Frame, Car Suspension Can Be Rendered Independent of the Load

By F. W. Bradley

ONE of the greatest obstacles to obtaining perfect car suspension is that road springs have of necessity to be calculated for a fixed load, while in practice they work under constantly varying conditions. The best suspended car is a racing machine, for here the distribution of weight is calculated to a nicety and modified by practical tests on the road and, with the exception of the gasoline in the tank, the load on the springs is constant. At the other end of the line is the 5-ton truck, the springs of which may be carrying a load of 18,000 pounds at one moment and at the next not more than half this amount. This explains why, even with the addition of springs and pneumatic tires, it is difficult to make a truck or a motor omnibus as comfortable as a touring car.

But even in the touring car class conditions are not ideal, and the lighter the car, or the lower the ratio of dead load to useful load, the more difficult is the task of the spring maker and designer. Every driver is aware that in practically all cases a car with its full complement of passengers rides more comfortably than when only the driver is aboard. So important is this that under certain road conditions the maximum average speed is determined more by the suspension than by the engine. Examples of this can readily be found on war-worn French roads. One particular instance may be cited. On a certain stretch of hard macadam road which had been badly worn by heavy army traffic and scarred by an occasional shell, the fastest cars were not those with the highest maximum speed, but those with the best suspension. In other words, certain cars with small engines but excellent general suspension made better time over this bad stretch than other cars with bigger engines but poor springs.

Usually, in touring car practice, the bigger the car the better the suspension. This arises from the fact that the variation in spring loading is much less in the case of the big car than for the small vehicle. A very light five-passenger touring car, having a load on the springs of 1700 lb. (this comprises frame members, engine, transmission, body and accessories) will carry a useful load of 750 lb. (five passengers at 150 lb. each). The maximum useful load put on the springs is about 44 per cent of the fixed load, and the minimum useful load is about 9 per cent of the same.

How Load on Springs Varies

In the case of the big, powerful car, carrying a heavy limousine body, the fixed weight on the springs may run as high as 4000 lb., while the useful load, as represented by five passengers, will still be 750 lb. This represents 18.7 per cent of the invariable load. With only the driver in the car the useful load of 150 lb. represents 3.7 per cent of the fixed load. This difference, in the case of the big car, is of such small proportions that if easy riding is obtained with the maximum useful load aboard, the riding will not be appreciably hard when only one man is carried. In the case of the light car, however, it is practically impossible to assure easy riding with the

Ten-horsepower Renault car fitted with Houdaille adjustable suspension (adjusted for full load)

Showing numerals on spring horn by which adjustment for different numbers of passengers can be made

maximum load and the same degree of comfort when 35 per cent of the load has been removed.

With a view to securing the same degree of comfort, whether the load be the minimum of one passenger, or the maximum of five or six, M. Maurice Houdaille has produced a device which was patented in all countries before the war, and has been brought to the production stage during the past few months. Mr. Houdaille is a French inventor well known beyond the limits of his own country by reason of his shock-absorbing devices.

Stiffness of Spring Varied

By this device Mr. Houdaille increases the stiffness of the spring as the load is increased; inversely, he renders the spring more flexible as the useful load is decreased. The adjustment is so made that the vertical distance between the spring center and any fixed point on the chassis frame is invariable, whatever the load.

This result is obtained in a very simple manner. Instead of a fixed eye at each extremity of the master leaf of the spring, there is an elongated groove within which the spring bolt can be moved by means of a suitable mechanism (lever or wheel) placed conveniently to the driver's hand. A glance at the illustrations will make the construction clear. With the minimum load the two eye bolts of each rear spring are at the outer extremities. As passengers are added, the two bolts are brought closer together, that is to say, nearer the axle, thus stiffening the spring. Thus, instead of the spring "flattening" as passengers get into the car, it retains the invariable curvature at which it can best do the work required of it. The invention does not change the appearance of the car to any appreciable degree. The links by means of which the spring eye bolts are moved in their grooves is carried inside the frame members and connected up to a lever placed near the driver's right hand. It is obvious, however, that there are several mechanical means of obtaining this movement, and that a wheel might be used instead of a lever.

This device is not an accessory to be added to the car in the same way as a shock absorber or a spring buffer. It is necessary for it to be incorporated in the design, in order to get the best results. Also, it does not allow of the drive being taken through the springs.

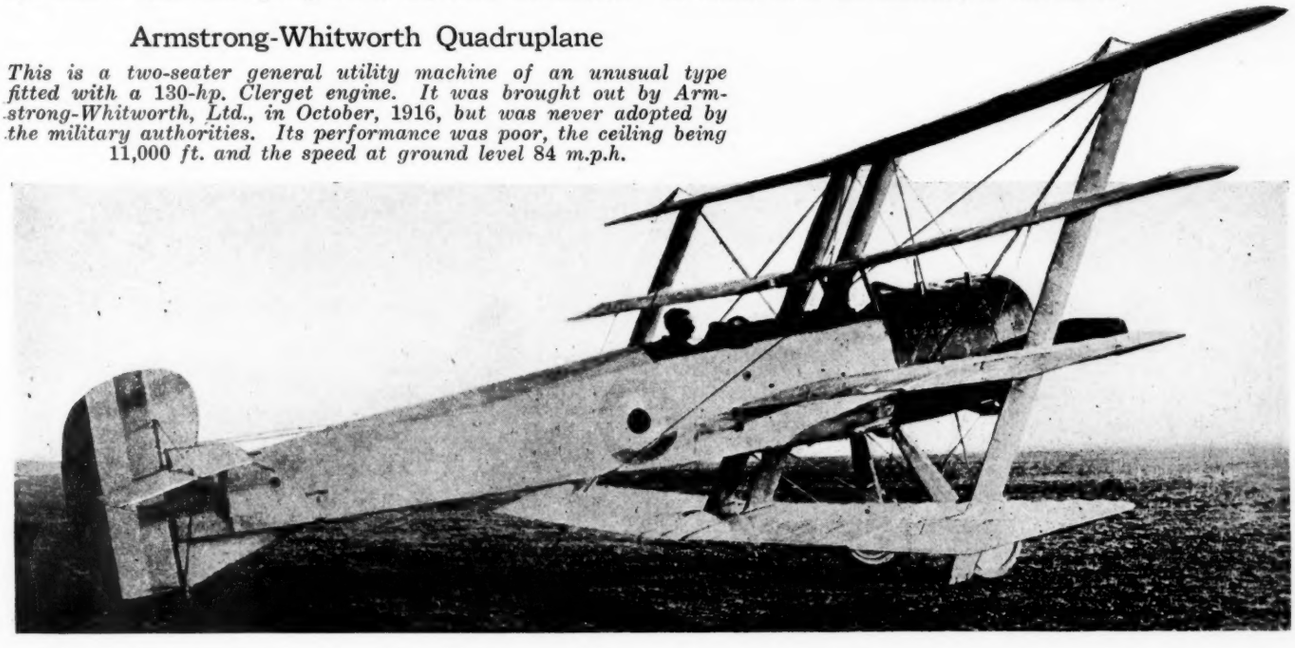
Device Tried Out on Renault

All the experimental and demonstration work in connection with this invention have been carried out on a Renault 10 hp. light touring car. The front springs remain unchanged; the rear springs have had the fixed eye changed for elongated grooves and the main bolts are movable in these grooves by means of suitable links and a side lever. Five positions are obtained, corresponding to 1, 2, 3, 4, 5 passengers. As a practical demonstration, I took this car on some of the granite paved roads in the suburbs of Paris, these being roads paved with rough granite blocks laid on a poor foundation and constituting, undoubtedly, the most destructive road surface to be found in Europe.

With only two persons aboard the lever was set so as to give the springs their maximum degree of stiffness; in other words, the springs were in the condition designed by Renault and were suitable for carrying 5 passengers. With this setting the car rode "hard" on the better stretches of road, while on the rough stretches it danced about in a manner painful for the riders and destructive to the whole mechanism. Pulling over the lever so as to correspond to the two passenger position, the same stretch of road was covered at the same average speed. The difference was so pronounced as to leave absolutely no doubt as to the efficiency of the device.

Armstrong-Whitworth Quadruplane

This is a two-seater general utility machine of an unusual type fitted with a 130-hp. Clerget engine. It was brought out by Armstrong-Whitworth, Ltd., in October, 1916, but was never adopted by the military authorities. Its performance was poor, the ceiling being 11,000 ft. and the speed at ground level 84 m.p.h.



Real Labor Representation

Plan of the Midvale Steel & Ordnance Co. Analyzed and the Reasons for Its Success Pointed Out—Based Upon Political Organization

By Harry Tipper

IN CONSIDERING the type of organization which should be created within the industrial unit to exercise those judicial and legislative functions which cannot be taken care of adequately by the executive organization, it is evident that the character of the industry and the different occupational requirements of its work will have considerable bearing upon the actual plan.

The contracting field, with its movement from job to job, and the difficulties attending the maintenance of the stable organization, presents an entirely different problem from the iron and steel industry, or the machine shop.

Where the labor problem is concerned with large industrial units governing to a considerable extent the local social conditions, the breadth and simplicity of the requirements will enable the manufacturer to establish an organization made up along somewhat similar lines to the political organization of this country.

Where the occupational requirements are sharply divided within the organization, and there is considerable social difference corresponding to these definitions, the organization which shall treat all employees with proper regard to the requirements of the case must take on a more complex character.

Where the character of the industry is such that there are no local units around which all or most of its productive activities center, the requirements of the matter will favor a different type of organization from either of the preceding.

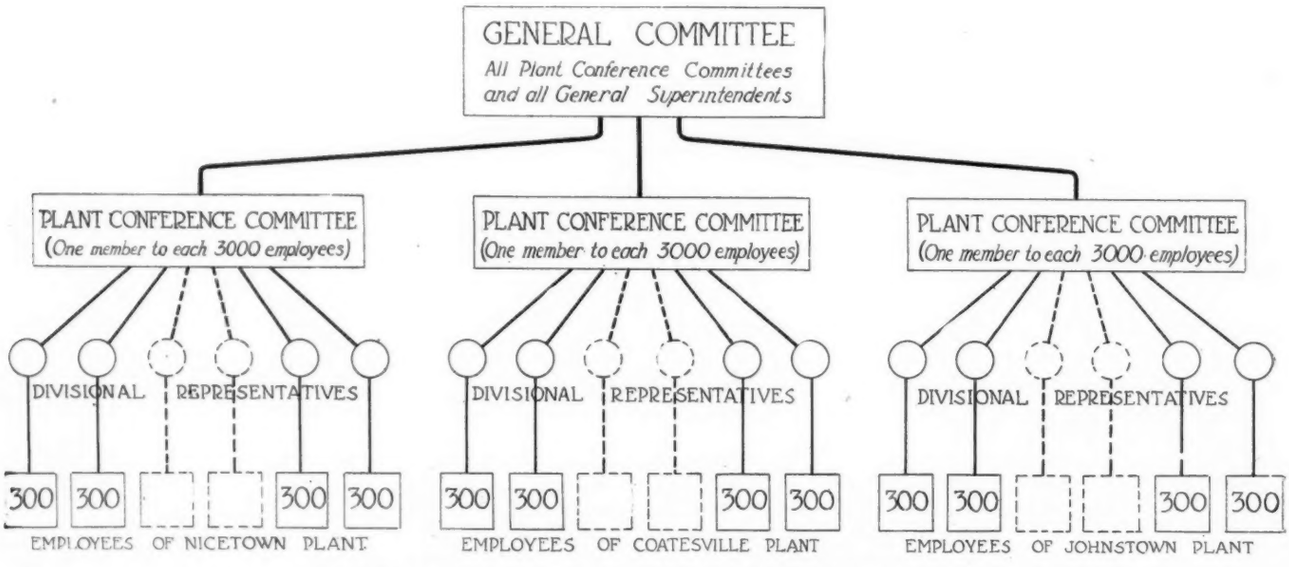
In the railroad field, for example, where one industrial organization deals with many localities, and where the very character of the business removes it to some extent from local considerations, methods which can be employed by factory units would not meet all the requirements of the case.

It is logical that in this field occupational labor organizations of a national character should secure great power, as the very character of the business ties the local bodies together in common desires and necessities to a much greater degree than in other industrial operations.

Conditions Govern Organization

In considering specific plans which have been worked out by a particular manufacturing organization, it is necessary to pay some attention to the conditions in the industry with which the organization in question is concerned. What may be of value in the iron and steel industry would probably require modifications in order to be put into practice in the textile field.

The governing principles, of course, are the same no matter what varying forms individual practice may have suggested, but a proper distinction must be made between the principles involved and the modifications in the application of the principle which have arisen out



GENERAL PLAN OF THE MIDVALE STEEL & ORDNANCE CO.

For general legislative purposes, joint quarterly meetings of all elected representatives and officials of the company are held. Judicial procedure in the adjustment of special grievances is from the employer to Division Representative, from Division Representative to Plant Conference Committee, to Joint Committee of Plant Conference and General Superintendent and from this committee to the General Committee

of the traditions of the organization and the special requirements of the industry.

For this reason a discussion of any plan which has been instituted as the result of experiments in any individual industrial organization will be accompanied with some comment from the conditions in that particular field, and the effect which such conditions may have had upon the application.

It is usual, however, for the differences in application to emphasize themselves in the consideration of changes or departures from custom, and it will be found that the similarities will greatly outweigh the differences in all cases. It should be thoroughly understood, therefore, that the details of the plan presented for consideration, which may not be applicable in any one's case, should not be allowed to militate against the value of the general experiment, or to obscure the fundamental character of the changes.

Organization Must Start Small

It is perhaps wise at this time to point out that organization as a growth must have its beginnings in the small thing. The machinery of a new organization should be founded so solidly upon known principles of organization that it will be capable of adapting itself to the larger requirements. But it is wise that the work specifically called to its attention should be of such a character in the beginning that it will have an opportunity to stabilize itself, strengthen itself, and carry its roots firmly into the business, before requiring it to attempt the solution of the largest and most difficult problem.

Some little time ago in the first part of this series of articles reference was made to the announcement of the Midvale Steel & Ordnance Co. in regard to its plans for the establishment of a co-operative organization within its own industrial unit. Since that announcement was made the first meetings have been held, the machinery of the organization has been established, and a part of its work begun. While the machinery of this oganization differs in some important particulars from experiments established at an earlier time, it will be seen that it provides the opportunity for the settlement of the matter specifically mentioned, not only but also for the disposition of many other matters as the organization welds itself together and develops its functions through the process of its own operations.

Better Operating Discipline

It is also necessary to point out that such machinery properly organized and operated so as to gain the confidence of the workers results in a better operating discipline. The fear which is frequently expressed by the employer that the establishment of legislative machinery and the allowance to the worker of a share in the responsibility for the decision affecting his working conditions, will result in a breakdown of discipline, has no basis in fact at all.

Instead of breaking down the operating discipline which is so necessary for the proper continuance of the production, the experience of individual organization contains plenty of evidence that the discipline has been increased by the incentive of responsibility and the consent which comes from a larger measure of understanding.

In the plan of the Midvale Steel & Ordnance Co., which is shown graphically in connection with this article, the only stated purpose is to provide a judicial means for taking care of the individual grievance and the individual complaint. There is nothing in the announced constitution of this machinery which specifically concerns itself with the settlement of the wage question, the hours, and other general economic conditions about which the labor union has so far concerned itself almost entirely.

It should be noted, however, that the organization as it has been established does provide machinery thoroughly applicable to these larger necessities. The fact that these matters are not mentioned in the plan should not therefore be allowed to limit its usefulness in the eyes of those who are primarily interested in the provision of organization machinery to dispose of these important questions.

It is evident that the Midvale Steel & Ordnance Co. has had in mind the necessity for limiting the purposes of the organization in its early stages so that it shall have an opportunity to get together and operate upon questions which are comparatively small; that is, upon questions which do not affect the general body of the workers, and upon which the habit of free discussion and proper agreement can be developed without some big question wrecking the newly formed organization machinery.

May Be Grave Mistake

It would be a grave mistake if such an organization were formed during the heat of controversy upon a general grievance and expected to deal properly with that grievance. The matter would touch the newly elected representatives too nearly. It would be affected too seriously by the strangeness of the individual in his new surroundings, and it would be too crucial a test. It is much better that the organization should be formed for stated purposes which are just as important, but which do not immediately affect the general welfare of the whole body of workers, nor the general financial development of the whole industrial unit.

The plan adopted as a result of the announcement made by the Midvale company to its workers was the final agreement of a conference between a committee of workers chosen from among the elected representatives of the employees, and the vice-presidents and general superintendents of the three plants of the company. The record of this meeting is sufficiently interesting to be included in this article.

The proceedings at these meetings were as set forth in the following extract from the minutes:

The meeting was called to order by Mr. Wm. B. Dickson, vice-president of the Midvale Steel & Ordnance Co., who addressed those present congratulating them on having been honored by their fellow-workmen by being elected as their representatives; and welcoming them to the Council table of the company.

Mr. Dickson then called for nominations for chairman of the meeting. John E. Koontz and F. X. Faas were nominated. On a show of hands Mr. Koontz was declared elected. On motion of Mr. Faas, properly seconded, the nomination of Mr. Koontz was declared unanimous.

Mr. Koontz called for nominations for secretary. Mr. Faas was nominated and elected for the position as secretary of the meeting.

For the purpose of facilitating the work of the conference, Mr. Dickson presented for the consideration of the employees' representatives, a tentative draft of a proposed plan for the purpose of establishing a representative system, which will provide a regular means of communication and conference between the officials and the employees of these companies. (In presenting this tentative draft, Mr. Dickson made it plain to the representatives that this was done not with any purpose of unduly influencing their action, but only to give some basis on which to proceed with the work in hand. As a matter of fact, the draft was amended in several important respects before final adoption.)

This draft was submitted, item by item, to the votes of the

(*Continued on page* 1010)

Apparatus for Checking Screw Threads

Machines Used in Inspecting Plug and Ring Thread Gages and Similar Threaded Parts Requiring Great Accuracy — Methods of Operation

OWING to the exigencies of war, much work has been done in recent years in the development of devices for inspecting and checking the accuracy of screw threads. The need for close inspection arose from the fact that threaded parts made in one factory had to fit parts made in another factory, and unless the threads were held within very close limits, this requirement could not be met. In the shop it is customary to use "go" and "no go" plug gages and ring gages and these gages necessarily must be subjected to a very rigid inspection.

The first instrument used for checking threaded parts as to diameter was the thread micrometer. However, as the Government departments used a more refined system of measurement, many thread gages which had been inspected by means of the thread micrometer and passed at the factory were rejected. The next step in measuring pitch diameters was the use of the wire system, two or three wires of standard sizes being placed in the thread on opposite sides of the screw, and a micrometer measurement taken over them. However, the way this system was applied in the beginning, by fastening the wires in place by means of rubber bands strung over their ends, which bent or bowed them, not sufficiently accurate results were obtained.

Gradually machines have been worked out by means of which the various systems of measurement evolved can be applied so as to insure the most accurate and rapid results. The angle of the thread is now generally measured and its contour studied by means of a projection machine. This consists essentially of a fixture for holding the thread profile in front of a stereopticon lamp, so that a greatly magnified shadow of it is thrown upon a screen, where it can be carefully studied and the angle accurately measured.

Two Types of Projection Machines

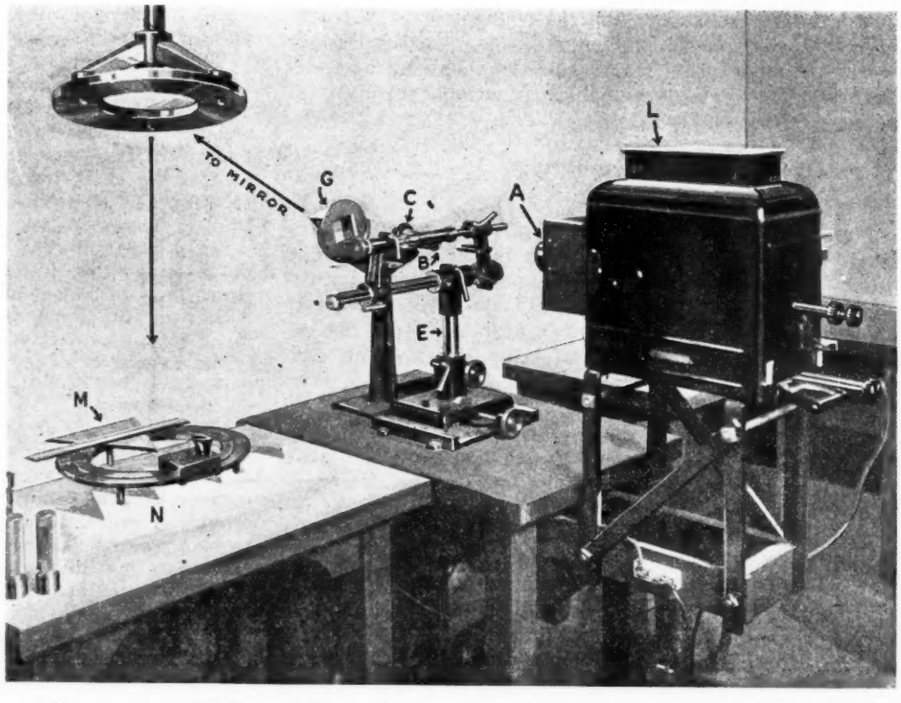
There are two general types of machines of this kind on the market. One of them is a machine of great length, in which the projecting apparatus is mounted at one end, and the screen upon which the shadow is cast, at the other, some 25 ft. away. In the other type of machine the image of the screw profile is thrown upward against a reflector suspended from the ceiling, this reflector throwing the image down onto a screen located close to the operator. The advantage of this type of machine is that one man can at the same time adjust a specimen, focus the light, and read off the result on the screen close to him. It is also obvious that much less floor space is required with a machine of this type.

A projection apparatus of a type designed by the Bureau of Standards, Washington, D. C., is manufactured by the Arthur Knapp Engineering Corporation, New York. An illustration of this device is shown herewith. The general principle of the device is as follows:

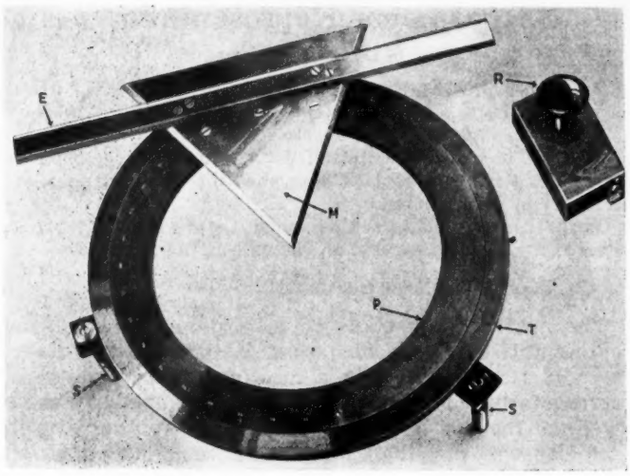
The threaded part (gage) to be examined is placed in a beam of parallel light, and by means of a suitable lens system, the shadow cast by the part is projected on to a screen. The field of parallel light rays is obtained from an inclosed arc lamp in a lamp housing *L*. The light from this lamp passes through the condensing lens *A* in the direction of the projecting lenses *B* and *C*. The screw to be examined is placed at the focus of the compound lens *B-C*, and the light is directed upwards by means of prism *G* to the mirror which is supported about 10 ft. above the prism. The mirror throws the beam of light down onto the top of stage *N*, which forms the screen and carries the standard angle *M* used in the examination of the thread form. In order that the shadow cast by the screw will be a true cross-section of the thread form, it is necessary that the parallel beam of light pass through the thread at the helix angle. To make it possible to give the beam of light the proper direction, the lamp housing carrying the condensing lens *A* is pivoted about a point beneath the lens *B*. This insures that the beam of parallel light from lens *A* will always be directed at and fill the lens *B*.

Method of Adjusting Test Gage

Three different adjustments are provided on the stand *E*, one for raising and lowering the screw or thread gage, to be inspected, another for focusing the thread, and a third for moving the thread in the direction of its axis, so as to permit various portions of it to be brought into the center of the screen. The gage to be examined is supported on spring centers on the stand *E*. For convenience in making observations, the gage is raised until the center of the beam of light passes the under side of the thread. Lamp *L* is then turned about the axis of its support until the parallel rays of light from lens *A* pass through the helix angle, which is the case



Set-up of projection machine. Notice the shadow of the thread on the table under the protractor



Bevel protractor used with projection machine

when the fringe pattern, formed about the image of the screw owing to imperfect focus, is symmetrical. The gage is then brought into focus by a slow motion device, and the required adjustments are complete.

Bevel Protractor

In the examination of the thread angle, use is made of a bevel protractor, also designed by the Bureau of Standards. The standard 60 deg. angle *M* is supported by three columns *S* on the stand *T*, on which rests a protractor ring *P*, carrying the standard angle *M* and the straight edge *E*. In making an inspection of the angle, the standard angle *M* is so adjusted that its shadow coincides with the light space of the projected image, on the surface of the table below. The standard angle *M* is evolved until one of its sides coincides with the shadow of the thread, and the reading of the graduated head is taken through a magnifying glass *R*. By means of a slow motion device on the stand *E*, the gage is then shifted parallel to its axis until the image of the other side of the thread approximately coincides with the other side of the standard angle. By means of a slow movement of the graduated ring, the standard angle is then revolved until it lines up with the other side of the thread, after which a reading of the graduated circle is again taken. The difference between the two readings shows directly the error of the included angle of thread.

By means of the protractor arrangement it is also possible to determine whether the thread is symmetrical about a line perpendicular to its axis. To this end the standard angle is revolved until either side is parallel with the crest of the threads, or else the straight edge *E*, which is perpendicular to a bisector of the standard angle, is placed parallel with the crests of the thread.

Accurate Results Claimed

It is claimed that by means of this shadow protractor very much better results can be obtained than by means of a protractor placed directly on the shadow. The reason for this is that by this method two objects of similar character, viz., two shadows, are presented to the eye. In adjusting the gage for a reading, the shadows of the thread and gage are made to approach, and the protractor is angularly adjusted until only a faint, even thread of light remains between the two. Under these conditions, an inaccuracy of a few minutes is easily detected. As regards the quickness with which observations can be taken, it is stated that it requires from one to 10 min. to measure the angles of the thread, depending upon the finish and straightness of the size of the threads being examined. Where the threads are particularly defective, their projection may be recorded on photographic developing paper in order to obtain a permanent record. For this the required time of exposure must be determined experimentally.

Another use to which this projecting lantern may be put is that of measuring profiles and determining the radii of circular arcs. In doing this kind of work, the image of the profile is thrown on a sheet printed with concentric circles, with radii varying by tenths of an inch. The shadow can quickly be matched with the proper circle, and the radius can then be determined by dividing the reading taken by the scale of magnification. The method is especially applicable to the determination of small profiles having angles which cannot be read by any other means. Irregular shaped profiles may be checked up by means of the micrometers on the gage holder, the result being plotted on a large scale with the co-ordinating dimensions of the two micrometers. The object is moved so that its projected outline passes over a point on the screen, and micrometer readings are taken for any required number of positions.

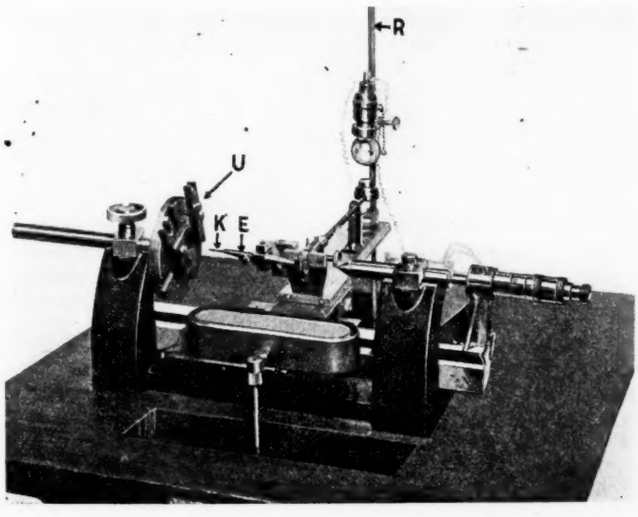
Determining Scale of Magnification

The scale of magnification may easily be determined by throwing the image of an object of known dimensions on the screen and measuring the same. Thread measuring wires will serve this purpose very well. For instance, if a wire of 0.1 in. diameter casts a shadow of 5 in. diameter on the screen, the magnification is 50. Therefore, the dimensions of any other object projected on the screen can be determined by dividing the size of the image by 50.

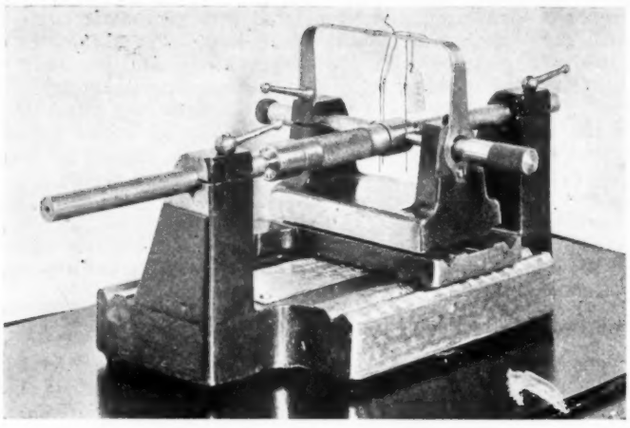
In order to obtain the most accurate results, everything must be properly adjusted. The reflecting mirror should be directly above the image which it throws on the screen, and this point can be verified by means of a plumb line. By means of the adjustable prism mounting, the light beam can be moved over a wide area, and no difficulty is found in throwing it directly on the mirror above. In order to obtain a parallel beam of light from the condensing lens *A*, the latter must be properly adjusted with respect to the arc lamp. To test this, a cloud of smoke from a pipe or cigar is blown into the beam emerging from the condensing lens. If this beam is of even size, as far as can be determined by the eye, the rays are sufficiently parallel for the purpose of a measurement. When the lamp is improperly adjusted, the smoke reveals diverging or converging rays. The proper condition is arrived at by moving the condensing lens closer to or farther away from the arc lamp.

It is also necessary that the table or screen be perpendicular to the central line of the projection system. This can be determined by removing the projection lenses *B* and *C* and allowing the light from the latter through the condensing lens to pass straight through. An ordinary mirror should be placed on the table or screen to reflect the light thrown on the screen. When this light is thrown back into the latter, the table is perpendicular to the rays. To test this, a card is held at the condensing lens so as to cut off one half of the beams from it. When the back of the card is lighted by the returning beams, the correct adjustment has been obtained.

The Arthur Knapp Engineering Corporation also manufactures an optical lead testing apparatus based on designs



Machine for optically determining the lead of a screw



Machine for determining pitch diameters

furnished to the Bureau of Standards by the National Physical Laboratory of England. Measurments are magnified about 20 times by a double armed lever, one arm of which is in the form of a stylus which, as the screw is moved in the direction of its axis by a micrometer device, follows the thread outline; they are further multiplied about 17½ times by an optical device. At the farther end of the lever is carried a lens located underneath an incandescent bulb. A fine line is ruled in silver on the bottom of this bulb, and the lens throws an image of this line onto a ground glass screen in front of the instrument.

Testing Pitch of Gage

In testing the pitch of the gage, the stylus *A* is brought to the bottom of the thread, the image of the line on the ground glass is brought to a fixed mark and the reading of the micrometer *S* is taken. Then the micrometer is rotated, the stylus moving to the next thread, the image is brought again to the mark, and another reading of the micrometer *S* is taken. The difference in the micrometer readings is the pitch. The machine will take a plug up to 3½ in. diameter and about 8 in. long.

When it is desired to measure the lead of a ring gage an equal-armed auxiliary lever is used. This is swung around so that the stylus rests in a V at one end of the lever, and an additional stylus at the other end enters the ring clamped on a face plate and is moved from thread to thread, the same as in measuring a plug gage.

Another machine manufactured by the same concern is used for measuring pitch diameter with the aid of measuring wires. The screw gage to be measured is held between centers, which in turn are held in clamps at the heads of pedestals on a base casting. A micrometer screw 9 is carried on a carriage 10 which on the opposite side carries an anvil. The carriage is supported on three balls in such a manner that it can move very freely.

Measuring wires are conveniently hung from a bracket 15. The anvil of the micrometer is set for zero by means of standard gage blocks or by making readings on a standardized screw. This machine will take plugs up to 3 in. diameter and 8 in. long.

Core Check Composition

In checking thread ring gages use is made of cast cores made from a composition having a known heat expansion coefficient. For examining the thread form of the ring gage, a cast is made of a segment of the gage. A special core composition is furnished for this purpose by the Arthur Knapp Engineering Co. This composition is melted in any convenient manner and by means of a ladle is then poured into the lower side of the ring gage, which for the purpose is held in a vertical position in a vise the jaws of which have been faced off so the composition cannot escape. Before pouring, the threads of the gage must be carefully cleaned with benzol in order that the cast may accurately represent the form of the thread.

Real Labor Representation

(*Continued from page* 1007)

employees' representatives and, as finally amended by them, on motion duly made and seconded, was adopted in the form as shown on copy attached hereto, marked "A," and, for the purpose of identification, initialed "A," and, for the purpose of identification, initialed on each sheet by the chairman and secretary of the meeting.

On motion duly made and seconded, the meeting adjourned, to meet again, if necessary, on the call of the chairman.

Each Clause of By-laws Discussed

The draft of the plan for the establishment of the representative system which was adopted by this meeting was referred back to a meeting of the employees' representatives in each of the three plants. At these meetings the discussion of the by-laws was made upon each clause so that the matter was thoroughly canvassed by the representatives in each of the works and finally approved.

It is too early yet to talk about the results which have accrued from the adoption of this system by the Midvale Steel & Ordnance Company, but it is possible to discuss the plans which were adopted as to their prospective strength and weakness in the light of other developments in organization methods.

The representation of the company upon the joint committees in the different plants is confined to the general superintendent of that plant. In general industrial work such a method would be likely to result in a weakening of the organization because of the limitation of the discussion to the man who while he is responsible for the general operating policy of the plant, cannot be acquainted with all the details which might be necessary to such a discussion.

Neither is it apparent that the general superintendent has the liberty of appointing a representative to be present at a joint conference where some unforeseen circumstances prevent his own attendance. In the average factory in the automotive field it would be desirable that department managers in the plant should grow up as a part of the legislative machinery, adding their value to its discussions and gathering increased effectiveness from the understanding which comes with such discussion.

Should Have Regular Meetings

There is nothing stated in the organization plan as presented providing for regular meetings of the representatives or the joint conference committees in the various plants.

This must be regarded as a grave mistake because the value of the whole machinery will depend upon the establishment of confidence and mutual esteem in the minds of the men who comprise the machinery, so that as the organization is called upon to discuss the larger questions at issue, the basis of understanding so established will permit it to come to a full measure of agreement.

This is partly taken care of by the provision for quarterly general meetings, although these general meetings do not entirely fulfill the purpose. It is interesting to note that there is contained in the plan for the election of representatives a provision for the recall of a representative by the employees of any division, where two-thirds of the employees sign a petition that the representative has ceased to be satisfactory to them. It is also important to note that one of the requirements for the election as representative is that the nominee shall have been in the employment of the company for at least one year in the aggregate.

Cultivating Japanese Automotive Field

PART IV

Government Is Most Successful Truck Builder—Industrial Companies Are Experimenting—Mechanical Difficulties Encountered—Shipping Charges and Customs Regulations

By Tom O. Jones*

THE most successful motor-car building in Japan to date has been the work of the Government at the Osaka arsenal in its production of twenty army trucks. In an effort to further the industry the Government has turned over its drawings to a large firm in Osaka, the Neohon Heiki Seizo Kabushiki Kaisha, a firm formed solely on the strength of an order for munitions from Russia, which has now been filled. The Government has asked this company to build one or two sample trucks, guaranteeing an order for a considerable number if they are satisfactory. The equipment of the plant, while very complete in the way of machine tools for finishing parts, is by no ways adequate for motor production. Foundry and forge facilities are not such as are needed for automobile units, while none of the special equipment for finishing special parts has as yet been installed.

The greatest argument for motor-car building in Japan is that the cost of labor is so much less in the Empire than in America that production could be carried on at much less expense, and that costs would be reduced by the saving in freight. The question of labor was referred to Dr. Ito, who has charge of the work being done by the Mitsubishi Dock & Engineering Co. at Kobe. In his opinion the low cost of labor will not offset the efficiency of the skilled American workman. Even with the highest type of automatic machinery he doubts whether equal results could be obtained.

LOW cost of labor in Japan will not offset the efficiency of the skilled American workman.

One of the principal reasons why car-building may not meet with success in Japan is the anticipated difficulty in engine construction.

Japanese companies would like to secure building rights on American cars and have many parts sent ready for assembling.

Japanese body builders are experts in the production of handmade enclosed bodies. Tools are primitive and wood is used exclusively.

Experimental Work by Industrial Companies

The Mitsubishi Dock & Engineering Co. is one of the largest industrial firms in Japan, and should it engage in motor-car manufacture would have a big advantage. It is going forward very slowly on its work. The company has bought a Buick and a Fiat car for experimental and pattern purposes. If steel is available, an effort will be made to bring out the first experimental car during 1918. Dr. Ito has studied many of the larger English and German motor-car plants, and if the company does enter the field its policy will probably be modeled after that of the Europeans. Several points have a bearing on the indefiniteness of the company's position. An important consideration is whether there will be a large enough market to warrant the outlay necessary. There are hopes that trade can be developed in China through branches and business connections in that country. At the present time the company is more interested in the development of airplane and marine engines. New buildings have been constructed and some special machinery required in engine building ordered or installed. Probably the outcome of this motor work will influence the decision for or against the building of automobiles.

The Tokyo Gas & Electric Industrial Co. has placed orders for a considerable amount of machine equipment for motor-car production, with a view to entering the manufacturing field on a large scale. Within the last six months this company has taken the Japanese representation for several American cars, or at least has had a considerable number of sample cars sent out. Though very serious in its plans to manufacture motor cars, probably more serious than any other organization in Japan, Goto Matsukata, the president, declares that the newly established motor department will continue to import American cars without regard to its manufacturing plans, realizing that it is impossible to build more than one type of chassis. The engineer of this firm, I. Hoshiko, is a graduate of Japanese technical schools and has spent several months in America, much of the time as a workman in an American motor-car factory.

The Kawasaki Dockyard Co., of Kobe, has also been considering the building of cars. According to one rumor, the firm was offered a contract for a considerable number of trucks by the Japanese Government, but no definite information as to the position of the company in regard to the matter could be obtained.

Difficulties in Engine Construction

The men interested in these companies realize some of the difficulties that face them in starting motor production, but it is doubtful if they realize them fully. One of the big troubles will be engine production, for engines built in Japan to date are not up to the standard required by the hard usage entailed by a motor-car installation. Magnetos, starters, and carbureters will without doubt have to be imported for some time, although

*EDITOR'S NOTE—*Mr. Jones was formerly with the J. B. Crockett Co., New York, and was given a special appointment by the Bureau of Foreign and Domestic Commerce to investigate automotive conditions in Japan, China, the Philippines and Hawaii. This story is taken from the advance proof sheets of Mr. Jones' report to his departments. Part V will deal with tires, accessories, etc.*

efforts to make them are now in progress. Almost without exception, the Japanese companies who plan to build would prefer to secure building rights on American cars, using the drawings of the American manufacturer from whom they secure rights, and have most parts sent from America ready for assembly. The simple castings and forgings would be made in Japan and the assembly completed and the bodies built there.

There is one point that should be considered by an American manufacturer who is approached with such a proposition. These companies are ambitious and will doubtless seek full export rights for the Far East, going even as far as India. If the parts were entered and assembled in bond under the supervision of the Japanese customs authorities, the American cars could be landed at any of the Far Eastern ports more cheaply because of the reduced freight cost on knocked-down shipments, the difference in labor costs, and the lower customs duty on parts. If the car is to bear the name of the American manufacturer he assumes responsibility for the assembly workmanship. If any American manufacturer has such a problem for consideration it would be well for him to consider, in connection with Japan, a China port such as Shanghai, a city with great American influence and in which there are many automobiles and a great number of trained mechanics.

Body building is practically the only branch of motor-vehicle construction that has been developed to any considerable extent in Japan, and it is shipping expense more than anything else that has brought about development along this line. Closed cars are by far the more popular type, and with shipping rates mounting as they have been in recent years the cost of importing complete vehicles from America would have been almost prohibitive, because of the impossibility of packing in a compact space.

Nearly All Bodies of Limousine Type

The bodies that are built in Japan show little or no variation. Practically all are of the limousine type. Wood is used exclusively in the construction and every one could be advertised as hand-made, the tools used being primitive indeed from the American standpoint, consisting of adz, saws, planes, and scrapers of various kinds. The wood most generally used is known as "katsura," fairly hard and capable of being worked to a very smooth finish. The cowl is cut from a large block of timber, roughly shaped at first with an adz-like tool, and later planed, scraped, and rubbed to the required form and finish.

The interior finish shows careful attention to detail. Upholstery is usually of light-colored Bedford cord, with braid trimmings and silk window and door curtains to match, although in the case of limousine bodies on low-priced cars leather is sometimes used.

The bodies are built wide enough so that three persons may sit on the rear seat, with two auxiliary seats facing back. Small armrests are provided for the auxiliary seats. Door fittings are of Japanese manufacture with nickel finish. Ash receiver and electric cigar lighters are fittings generally applied. The weight of such a body for a car of 116-in. wheelbase will be approximately 600 pounds.

The workers in the factories receive approximately 50 cents United States currency per day, but there doubtless will be a demand for higher wages in the near future, if an advance has not already been made, as increased cost of living has brought about labor troubles in Japan within the last year. The price of such a body fitted to a car of the size above mentioned is $700.

The finish is of Japanese lacquer, which gives a glass-hard finish of good luster. This finish stands well in ordinary use, that is, in its resistance to scratching, but if given a blow hard enough to crack or chip the lacquer, the repairing is an operation that entails considerable labor, more than the repair of a scraped finish on a metal body.

Do these bodies stand up? You can hear various opinions on this point. They certainly look well enough when turned out and some over a year old are in good condition. One American dealer said that he would not allow such a body to be fitted to the high-priced American car he handles. The main fault is that the wood is not properly seasoned.

Shipping Routes and Costs

Practically all motor-car shipments to Japan go via Pacific coast ports, either Vancouver or San Francisco. The following tables give a comparison of freight costs for shipments via Panama and direct from San Francisco. The car selected for this purpose is one selling for approximately $1,000 and weighing in the neighborhood of 3000 pounds, with a case measuring 320 cubic feet. The point of origin selected is in the Middle West, near the center of the industry. These figures are based on rates quoted about March 1, 1918, and are submitted only for the purpose of comparing transportation costs on eastward and westward shipments in carload and less-than-carload lots.

Transportation of 1 car from factory to Yokohama via San Francisco:	
Inland freight to San Francisco	$133.53
California toll tax	.40
Ocean freight	144.00
Consular fees	3.00
Insurance	13.20
	$294.13
Transportation of 1 car from factory to Yokohama via Panama Canal:	
Inland freight to New York	$45.98
Cartage to steamer	12.00
Consular charges	4.00
Forwarding charges	3.00
Ocean freight	260.00
Insurance	7.80
	$332.80
Transportation of 4 cars from factory to Yokohama via San Francisco:	
Inland freight to San Francisco	$334.35
California toll tax	1.60
Ocean freight	576.00
Consular fees	3.00
Insurance	49.50
	$973.45
Transportation of 4 cars from factory to Yokohama via Panama Canal:	
Inland freight to New York	$137.34
Cartage to steamer	48.00
Consular fees	4.00
Forwarding charges	3.00
Ocean freight	1,040.00
Insurance	30.00
	$1,262.34

There is no great obstacle in the customs requirements confronting either the Japanese dealer or the American manufacturer, but care should be taken in the preparation of invoices. At the present time France has a commercial treaty with Japan which gives French manufacturers special concessions in what are known as the conventional duties. These same privileges are extended to the American manufacturers under the most-favored-nation clause, but to secure them the manufacturer must attach a certificate of origin to each group of invoices covering shipments. These certificates may be secured from the Japanese consul nearest the manufacturing city. (In the case of manufacturers in Michigan, Indiana, Ohio, and Wisconsin this is Chicago.) As the general rate of duty is 50 per cent ad valorem and the conventional duty but 35 per cent, the saving on such certificates at $2 each is manifest. Under the conventional

(*Continued on page* 1036)

History of Cotton Airplane Fabric*

A Successful Substitute for Linen Developed by the Bureau of Standards in Collaboration with Airplane Engineers and Cotton Mill Experts

THE design of heavier-than-air machines during their early stages of development was arrived at by cut-and-try methods. The wings of such machines were covered with plain cotton fabric, much the same as an ordinary sheeting material, coated with a beeswax compound or some form of glue. The wing surfaces were then rubbed and polished to present a surface having a comparatively low skin friction. Such a covering was not very strong and sagged very materially when subjected to pressure and when exposed to weather.

As the application of science produced planes which were capable of much higher speeds, smaller wing surfaces, and a constantly increased loading per square foot of wing surface, it became necessary to cover them with a material having a high strength and a low weight.

It was generally known that flax spun into yarns and subsequently woven into fabrics produced a very tough material having little stretch and the property of withstanding shocks with very little permanent set.

Linen Sheeting Very Satisfactory

Accordingly, unbleached linen fabric was used to cover the wings of planes and found to be very satisfactory. The structure of the linen fabric is that of an ordinary fine linen sheeting. No attempts had been made to study the requirements of the covering material or to design a fabric meeting those requirements which might possibly be lighter and more resistant than the linen fabrics.

During the present crisis it became evident that the available supply of linen would not suffice the demands of the military programs of the countries at war, and it became necessery to find materials which could be used in place of the satisfactory linen.

As early as January, 1916, the Bureau started investigating the possibilities of substituting cotton for linen airplane fabrics, and found that the general consensus of opinion among airplane manufacturers and investigators here and abroad was that the use of cotton fabric for wing coverings was out of the question, as many experiments had already been made to substantiate these opinions.

However, we were certain that not all the possibilities of structure of fabric had been considered, and we began an investigation to study the stresses in a fabric on a plane and to thoroughly determine by actual measurement the properties of the linen fabric and to incorporate the desirable properties of the linen in a cotton fabric suited for the purpose.

The difficulties experienced in the experiments on cotton fabrics previous to the time of our investigations were: (*a*) low strength per unit of weight; (*b*) low tearing resistance; (*c*) little shrinkage upon application of dope; (*d*) little tendency to retain what little shrinkage they had after doping.

It was not until March 18, 1917, that we were in a position to issue instructions covering the construction of cotton fabrics for the experimental fabrics which proved to be quite successful. These instructions were sent to the various fine-goods cotton mills and were supplemented by visits of our textile experts to the mills.

At the mills our textile men sat down with the practical men and evolved the present cotton airplane fabrics. At this point I wish to mention the name of Mr. Richartson, agent of the Ponemah Mills, as he did much to make cotton fabrics a success.

The first fabrics of this series were received at the Bureau on or about the first of April, 1917, and as the series progressed we suggested changes, and during the early part of May, 1917, a fabric had successfully passed our laboratory standards. The next important problem was to determine the actual performance of these fabrics. To this end samples were placed on Army planes at Langley Field and Navy planes at Pensacola during August, 1917. Similar fabrics were later sent by the Signal Corps to the Canadian Aeroplane Company, of Toronto, Canada, and they were placed on planes the middle of October, 1917.

The results of the service tests demonstrated that the fabrics were satisfactory and that service results could be reliably predicted in the laboratory. In view of this we felt justified in modifying the structure of these fabrics, and in co-operation with R. L. Kingston, then with the Curtiss Aeroplane Co., and with A. R. Pierce of the Pierce Mfg. Co. the present Grade A cotton fabric was evolved.

It was not until August that the military authorities were becoming concerned with the scarcity of linen, and on or about the 23d of August the Joint Army and Navy Aircraft Board called the Bureau into a conference regarding cotton fabrics for airplanes, and we were able to say with a great degree of certainty that we had a fabric ready for their needs.

On Aug. 24, 1917, a conference held between the military authorities and representatives of the Bureau resulted in the Signal Corps Equipment Division ordering that the Bureau of Standards supply the necessary specifications covering the purchase of 500,000 yd. of airplane cotton fabric. The specifications were transmitted by the Bureau of Standards on Sept. 5, 1917, covering the fabrics now known as Grade A and Grade B as used by the Signal Corps and Navy. A few days later the Bureau supplied the necessary information regarding the apparatus and methods of testing and inspection.

The Department of Agriculture was invited by this Bureau to assist in further development, and the experiments were started during September, 1917, but because of some unfortunate circumstance we were unable to keep in touch with the work. During April, 1918, the Signal Corps submitted samples which we understood to be the result of these investigations. They dealt with the use of the various cottons and the experiments were very valuable.

Adopted by the English

Recently the standard fabrics were submitted to the English airplane authorities and their comments were to the effect that the results of their tests were astonishingly successful. Since that time the English have adopted the standard Grade A fabric.

At the time we were making our field tests at Langley the Italian Aviation Mission was there. One of their planes was covered with a cotton fabric which they had used successfully on the battle front, and the members of that Mission offered the opinion that our fabrics were better than their own successful fabric. It is a peculiar thing that upon analysis this fabric differed but slightly from our own as far as thread count and yarn number were concerned. Here were two people working on the same problems, on opposite sides of the water, and having no information regarding each other's work, and the results were practically the same.

LEON MORANE, a famous French pioneer in aviation, died in Paris last month. Morane first came into prominence as a pilot of Bleriot monoplanes, and had a bad crash when starting off for a flight for a Michelin prize from Issy to the Puy de Dome in October, 1910. Later he designed a monoplane on Bleriot lines, which he built in conjunction with M. Borel.

*From a paper by E. Dean Walen presented to the American Society of Mechanical Engineers at New York.

Fuller & Sons Tractor Transmission

A Three-Speed Transmission with Direct Drive on Second Speed—Belt Pulley Drive Through Bevel Gears

FULLER & SONS MFG. CO., Kalamazoo, Mich., a firm well known in the automobile and truck transmission field, has recently brought out a transmission gear for tractors, known as model TR-2. It is of the unit power plant type, and is designed to be fitted to four-cylinder engines up to 326 cu. in. piston displacement, which makes it suitable for both two and three-plow tractors.

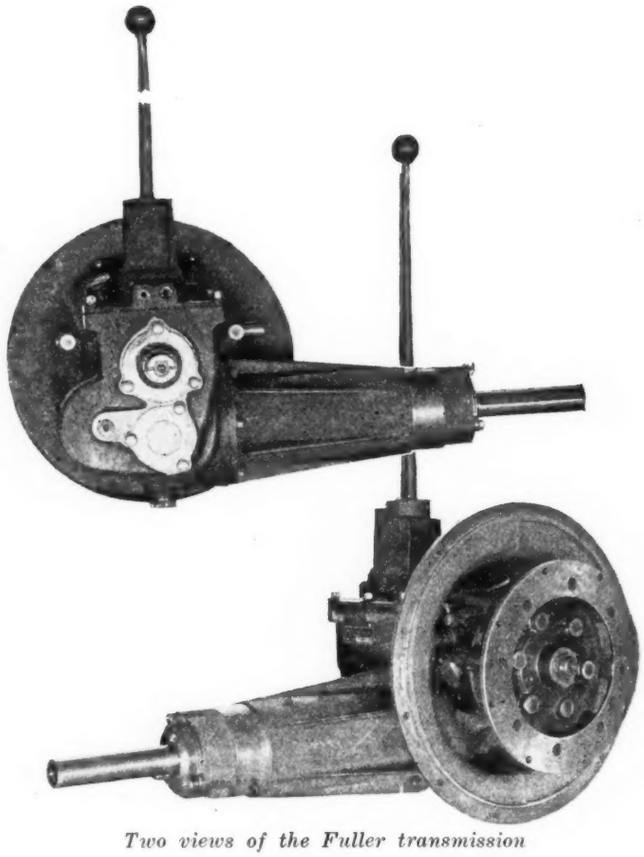
In a general way the transmission is of the automobile type, and is complete with clutch and control devices. It affords three forward speeds and one reverse, but instead of the high speed being a direct drive, the intermediate speed, which is the normal plowing speed, is made the direct drive. On the first speed there is a gear reduction in the transmission box of 1.7:1; the second speed is direct, and the third speed is a geared up speed in the ratio of 1:7.

The clutch is of the multiple disc-in-oil type, and drives through case hardened nickel steel studs. The shafts are made of chrome nickel steel, of extra large diameter, and are hardened and ground. The main shaft is of the four-spline type, 1⅞ in. over the keys. All shafts are mounted in annular ball bearings. The reversing pinion is extra large, having 23 teeth and runs on a solid roller bearing.

All gears are made of nickel steel, case hardened. They are controlled by means of a ball-mounted, ball-handled control lever. This is made from a drop forging, and can be bent to suit customer's requirements. The shifting mechanism is so designed as to give a positive interlock, in addition to being provided with position finders.

The belt pulley shaft is driven from the secondary shaft of the transmission through bevel gears and runs at 85 per cent the speed of the crankshaft. A choice is offered of three types of bell housing—No. 2 S.A.E., No. 3 S.A.E., and Continental type N.

Both the transmission housing and the clutch housing are oiltight. The former is kept half full of heavy oil, while the clutch housing is kept one-quarter full of motor oil. Self-adjusting stuffing boxes over bearings prevent leakage of oil.



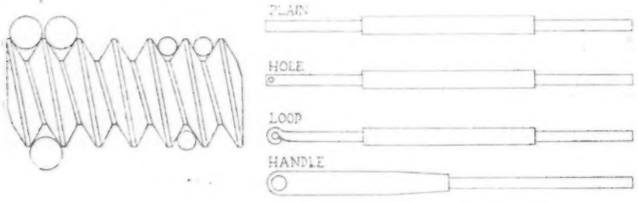
Two views of the Fuller transmission

Fortney Measuring Wires

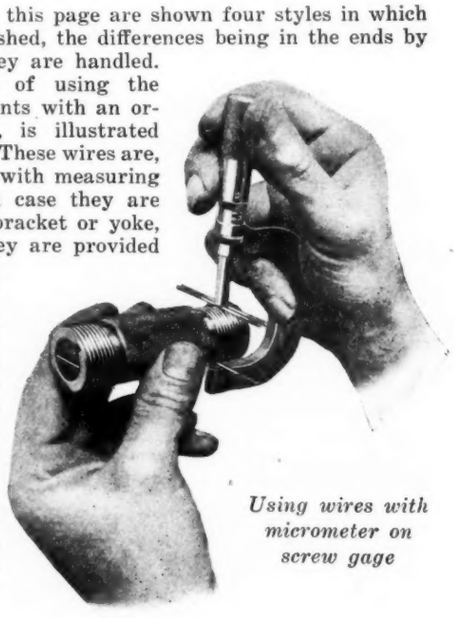
THE Fortney Mfg. Co., 13 Franklin St., Newark, N. J., manufactures standard wires for checking up the pitch and angle of thread of screws and screw gages. In the use of these wires, two wires of a given size are placed in the thread on one side of the screw, another wire is placed in the thread at the opposite end of the screw, and a measurement over the wires is then taken by means of a micrometer. For each pitch two sizes of wires are made, a maximum wire and a minimum wire.

These standard measuring wires are used particularly in manufacturing thread gages. We understand that they are approved by the U. S. Bureau of Standards, and that of a lot of 1500 recently furnished the U. S. Ordnance Department not a single one was rejected.

The wires are guaranteed to be straight, round and accurate within .00002 in. of the required size. They are made for both U. S. Standard and Whitworth threads for all pitches from 80 per inch up.



In the line cut on this page are shown four styles in which the wires are furnished, the differences being in the ends by means of which they are handled. The common way of using the wire, in measurements with an ordinary micrometer, is illustrated by the photograph. These wires are, however, also used with measuring machines, in which case they are suspended from a bracket or yoke, and to this end they are provided either with a hole, loop or drilled handle, as shown. The method of placing the wires in the thread is also shown in the line cut. Two wires are placed parallel in adjacent threads on the same side of the screw and the third wire is placed on the opposite side.



Using wires with micrometer on screw gage

The FORUM

Universal Joints as Shock Reducers

By C. A. Schell
Chief Engineer, The Thermoid Co.

IN addition to the fact that fabric disk universal joints and couplings require no lubrication or attention, engineers who are experimenting along these lines find they have many other advantages over the metal construction. The two most dominant are their shock absorbing and sound insulating qualities. No better argument for the shock absorbing or reducing ability need be cited than their adoption by the manufacturers of so many of the military tractor units both here and abroad. The great majority of these were of the caterpillar type, and in many of these positive types of clutches were used causing a great amount of shock to be transmitted throughout the unit. Some of these machines were used under the worst possible conditions and flexible disk connections acting as shock reducers between motor and tread were of great help.

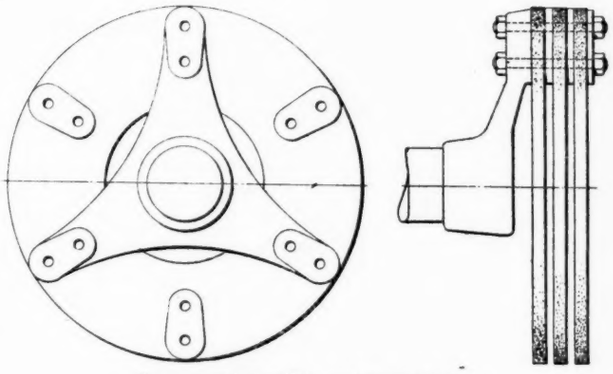
The conditions encountered in military use are very severe, but the average motor truck is subject at times to conditions which are very trying and costly. One of these is the application of heavy chains for winter driving. Invariably five or six pieces are wrapped around a solid tire and the wedging action, especially on hard frozen ground or brick, causes a reversal of stresses from the tire to the motor which can be nothing but very harmful. Of course when a flexible connection is inserted between the two positive units, the wheel and the motor, these two can be regarded as independent or floating, as the flexibility of the disk allows this. When the wheel strikes stiff, unyielding obstacles in the road or when the clutch grabs quickly these same conditions take place, but in the writer's opinion the action of heavy chains is the worst, owing to its severity and continuity.

Tried Out on 3-Ton Truck

In an effort to determine what effect driving chains would have on the chassis, the writer carried out several interesting road tests. Several transmission main shafts were obtained for a 3-ton truck on which the rear ends were turned down from a 1¾ in. S. A. E. taper to a 1¼ in. size. Some of these were installed in this truck and ran several thousand miles over smooth brick roads very well when no chain equipment was used on the tires. With the application of chains, however, these shafts were all fractured in less than 1000 miles each when the truck was driven over snow-covered brick and frozen dirt roads. Of course, the shafts were made small purposely for this particular unit in order to get quick comparative data. In the first runs the truck was equipped with all metal joints on both propeller shafts. In following tests the same unit was driven with chains attached under similar conditions, but equipped throughout with flexible disk joints. The shafts in these tests stood up over a mileage several times greater than with the metal joint equipment, showing conclusively the shock reducing ability of this construction. In laboratory tests also, shafting, gears, splines, etc. are found to stand several times the number of sudden shocks when transmitted to these parts through a disk connection than when run through an all metal unit.

Seven Degree Flexing Range

In these tests disks made up by the Hardy laminated construction and consisting of 60 per cent fabric and 40 per cent rubber were used. The wind resulting from application of maximum torque was 7 deg., which can be used with good results for all automotive work. The above figures leave no question but that disk joints made up elastically enough in torsion can be used as shock reducers in addition to their function as joints, and will add much life to the chassis. The great majority of trucks equipped with worm driven and



Layout of flexible universal joint

double reduction axles have comparatively straight line drives, the shaft angle never running over 7 deg., and on such layouts the flexible joint is ideal. With the low angle the lateral movement is very small and no spline is required, consequently no lubrication whatsoever is needed. If time and care are taken in designing the metal parts and a well constructed disk is employed, a long-lived trouble-proof assembly is the final result.

Advantage of Silent Operation

Passenger cars are not subject to the severe conditions encountered with commercial vehicles, but, nevertheless, flexibility in the drive is of great benefit. Aside from the shock resisting function the strongest argument for this construction is the elimination of greasing and all noise and backlash. Axle noise is not so objectionable at the axle in itself as is the multiplicity of the noise as it is transmitted through the propeller shaft to the frame. This can in most cases be dampened with a fabric disk so that it is practically unnoticeable. At the present time one of the five largest passenger car makers, who has been having trouble of this kind in the past, is adopting this construction on a new model, after going into this phase of it very thoroughly. Many of the lower-priced cars develop considerable backlash between clutch and wheels after about 15,000 miles of use, owing to the wearing of so many connections. This is especially noticeable when engaging the clutch. Not only does the flexible joint eliminate nine of the wearing parts, but it also makes the clutch engagement feel much softer. In other words, all this backlash is unnoticeable because the slack in all the metal parts is taken up between the two positive units (motor and wheels) gradually. The maximum load is only applied after the disk has stretched the allowable amount. This factor can best be appreciated by equipping a car with both types of joints after it has been run 15 or 20,000 miles. With the flexible disk installation it is practically impossible for the most expert drivers to detect any backlash.

Will Be Much Used in Post-War Models

Both abroad and in this country a large number of makers have concluded tests and will use this construction on post-war models. Some of the smaller chassis will be equipped with assemblies consisting of three 6½ by ¼ in. disks, while some of the larger cars will require three disks 8 in. in diameter. For passenger car work this joint should not be used where the maximum shaft angle exceeds 10 deg. After the angle runs beyond this point the disk is under considerable lateral stress and will not have the proper life. In some cases, however, where the shaft angle is too severe for this construction some of the makers will use a flexible fabric joint at the axle end of the propeller shaft with the metal joint forward.

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

PUBLISHED WEEKLY

Vol. XXXIX Thursday, December 12, 1918 No. 24

THE CLASS JOURNAL COMPANY
Horace M. Swetland, President
W. I. Ralph, Vice-President E. M. Corey, Treasurer
A. B. Swetland, General Manager
U. P. C. Building, 231-241 West 39th Street, New York City

BUSINESS DEPARTMENT
Harry Tipper, Manager

EDITORIAL
David Beecroft, Directing Editor
P. M. Heldt Sydney Oxberry
DETROIT OFFICE WASHINGTON OFFICE
J. Edward Schipper Allen Sinsheimer

BRANCH OFFICES
Chicago—Mallers Bldg., 59 East Madison St., Phone Randolph 6960
Detroit—95 Fort Street, West, Phone Main 1351
Cleveland— Guardian Bldg., Phone Main 1142.

Cable Address - Autoland, New York
Long Distance Telephone - 8760 Bryant, New York

SUBSCRIPTION RATES
United States and Mexico - One Year, $3.00
Canada - One Year, 5.00
Foreign Countries - One Year, 6.00

To Subscribers—Do not send money by ordinary mail. Remit by Draft, Post-Office or Express Money Order or Register your letter.

HORSELESS AGE SUBSCRIBERS

Subscriptions for the Horseless Age transferred to the subscription list of AUTOMOTIVE INDUSTRIES in the merging of the two publications will be completed in full by the weekly issues of AUTOMOTIVE INDUSTRIES to the dates of expiration shown on the records of the Horseless Age Co.

Owned by United Publishers Corporation, Address 243 West 39th St., New York; H. M. Swetland, President; Charles G. Phillips, Vice-President; W. H. Taylor, Treasurer; A. C. Pearson, Secretary.

Entered as second-class matter Jan. 2, 1903, at the post-office at New York, New York, under the Act of March 3, 1879.

Member of the Audit Bureau of Circulations.

Automotive Industries-The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907.

The Future of Engineering Standardization

IN the past practically all engineering standards have been national standards, being used only by the nation which originated them. As a result of the war, however, it now looks as though standardization work in future would assume an international character. We need only refer to the work of the International Aircraft Standardization Committee, which bears out this point. At the present time a movement seems to be on foot to unify the screw thread systems of the United States and Great Britain. Each of these nations lately has evinced considerable interest in the other's standardization work, and at the recent meeting of the American Society of Mechanical Engineers in New York a paper on the work of the British Engineering Standards Committee was presented by Secretary Le Maistre of that committee, and a paper on the work of the committee on screw threads and limit gages was presented by Sir Richard Glazebrook, director of the National Physical Laboratory of Great Britain.

These events seem to forebode an extension of the scope of future standardization work. It seems logical that if there are benefits to be derived from the use of certain standards throughout a nation, the benefits would be greater if these standards were in universal use. This argument may possibly be controverted on commercial grounds. But the same objection has been made to standardization on a narrow scale and has proven entirely untenable. Some manufacturers object to using standards because it enables the customer to purchase repair parts in the open market instead of compelling him to buy them from the maker of the machine. The customer, however, objects to being limited to a single source for parts of such character as are in general use. Thus, while the exclusive use of special, non-standardized parts may result in increased parts sales it introduces a certain amount of sales resistance which outweighs the advantage accruing from it. It has thus been proven conclusively that national standardization will not act to the detriment of the individual firm and similarly it may be assumed as certain that international standardization would not result in the injury of any nation.

English and Metric Standards

The great obstacle to the adoption of universal standards at the present time is the use of two different systems of weights and measures, the English and the metric system. Of course, it is quite possible to express any standard whatever it may be in both systems of measures. For instance, the S. A. E. screw standard can be readily translated into metric measures, but whereas in the inch system most of the figures used in the enunciation of this standard are integers or common fractions, in the metric system irrational fractions would have to be used. The standard is therefore distinctly an inch standard, though it can be expressed in metric terms.

In the aircraft standards published by the International Aircraft Standardization Committee while it was sitting in Washington last winter, all dimensions, stress allowances, etc., are given in both inch and metric units, but whereas many of the English dimensions are in round figures all the metric dimensions are in three-place decimals. Many of these aircraft standards had been worked out by the S. A. E. and merely adopted by the International Committee. It appears that the International Committee has been dissolved and that what aircraft standardization work is being done now is being carried on by national committees. Another international meeting is planned for next year, however, at which time the standards adopted by the various national committees will, no doubt, be proposed for adoption as international standards.

International standardization work will undoubtedly receive full consideration during the period of readjustment. It will probably take one or the other of two possible forms: Either the standards will be formulated in metric measures and will find substantially universal application, or the two countries using the English system of measures, Great

Britain and the United States, will unite in evolving a common system of engineering standards, to strengthen their commercial position in competition with metric countries in the export fields. The move to unify the screw thread standards of Great Britain and the United States is indicative of the tendency in the latter direction.

Probably the closest approach to a universal engineering standard to be found at the present time is the annular ball bearing standard. This is a combination metric and English standard, as the ball diameters are given in fractions of an inch, whereas all dimensions of the races are given in millimeters. The chief magneto dimensions, so far as mounting is concerned, including shaft height and location of base screw centers, are another instance of a universal standard. On the whole there seems to be greater readiness to adopt metric standards in countries using the English units than English standards in metric countries.

"The Spirit Maketh Alive"

THE attitude of capital and labor toward each other changes slowly. But that it is changing, and changing for the better, there can no longer be any doubt. Until the change becomes universal we will always have internal strife and a high rate of labor turnover.

That apt old adage to the effect that "you can't teach an old dog new tricks" probably fits the case better than any other homely analogy, and accounts in no small measure for the slow shift in attitude which is apparent.

It is the new blood, the younger generation that has seen the situation in its true light and that is leading the procession toward a true recognition of the rights—or better let us say, the just due—of both.

These are the men who are first to recognize that workers are not slaves, that they are human beings with human cravings and human grievances.

And it is these men who are slowly but surely opening the eyes of their predecessors to the need of applying the Golden Rule in the treatment of men.

John D. Rockefeller, Jr., voiced the modern attitude of capital toward labor when he said last week at Atlantic City: *"The letter killeth; the spirit maketh alive."* The older generation of employers did not, and in too many cases do not, believe this truism—or it may be they have never thought about it. At any rate, theirs has been the law of the letter rather than the law of the spirit.

". . . . *only as the parties in industry are animated by the spirit of fair play, justice to all and brotherhood, can any plans which may be mutually worked out succeed,*" said Mr. Rockefeller.

That is not only good sentiment to subscribe to; it is an economic truth. Confidence is the basis of all work which requires mutual operators, and it is established not by control but by understanding.

Only the tradition of the years prevents this universal belief becoming universal practice.

Tractor Engine Cooling

IT is not an uncommon sight to see a tractor steaming at the radiator while hauling a plow, indicating that its cooling system is of insufficient capacity. Designers do not always realize that on a tractor an unusual amount of radiating surface is required. This is so, partly because the speed is very low and does not induce appreciable air circulation through the radiator, and partly because kerosene is usually the fuel burned, which, on account of incomplete vaporization previous to ignition, is slower-burning and entails a greater loss of heat to the water jacket. Not only must a tractor radiator have more cooling surface per engine horsepower than an automobile radiator, but it must be of more robust construction, owing to the severe vibration to which it is exposed. Owing to the need for heavier construction it is impossible to get as much cooling surface into a given space, and a tractor radiator is not only heavier but also bulkier than an automobile radiator.

In the past radiators have been fitted to tractors largely by the cut and try method. The problem of radiator size required is naturally a rather complex one, as a considerable number of factors are involved, and the lack of experimental data made it almost impossible to determine the proper size without extensive experimentation. What was needed was the development of a rational formula permitting of expressing the capacity of the system for dispersing heat as a function of factors which are easily fixed or determined. Naturally such a formula would involve a constant, the valve of which would depend upon the core construction employed.

In an article in another part of this issue by Mr. Goldberger a formula intended to serve this purpose is derived, giving the cooling surface required per horsepower under different conditions of operation. The equation is simpler than most radiator capacity formulæ that we have seen. The only difficulty we can see in connection with its application is that the rates of air and water circulation cannot be predetermined with any degree of accuracy without having a radiator of the type to be used available for tests. This, of course, means that we must still cut and try, though the formula ought to be an aid to our judgment after the constant for the type of core to be used has once been determined.

Undoubtedly considerable opportunity for the immediate sale of automobiles is offered by the small neutral countries of Northern Europe. During the war these countries prospered materially, but owing to embargoes and scarcity of shipping they were unable to secure all the cars they wanted from abroad. These countries do not have to face the same problems of reconstruction and readjustment as the belligerents and they will therefore be first in the market for cars.

Already there are signs that these opportunities are not being neglected by our export houses and manufacturers.

□ Latest News of the

50,000-Mile National Highway Proposed at Chicago Conference

Cost to Be $25,000 per Mile and Road System to Reach Fully 90 Per Cent of the Population—Federal Money to Be Furnished and Administered by National Highway Commission

CHICAGO, Dec. 11—*Special to* AUTOMOTIVE INDUSTRIES—A National Highway Commission to build with Federal money a system of national highways was the proposal made to-day before the joint meeting of the association of State Highway officials and the Highways Industries Association. The meeting is the first of a series extending over three days, and held for the purpose of placing the doctrine of Federal Highways administered by a Federal Commission before Chambers of Commerce, Rotary Clubs, State Highway officials and the general public.

The meeting has drawn together nearly one thousand delegates, and from the sentiment apparent at the initial sessions the conference will go on record as strongly favoring the appointment of a National Highways Commission with power to allocate Federal money for a system of interconnecting state roads which shall in effect become a great national highway.

The meeting applauded loudly and long when E. J. Mehren, vice-president of the Highway Industries Association, laid down as the platform of the gathering the building with Federal money of a national highway embracing fifty thousand miles, to cost twenty-five thousand dollars a mile and to reach fully ninety per cent of the population of the United States. It was brought out that such a system would give each state at least two highways and that the entire cost might be spread over a period of twelve and one-half years. The opinion of the meeting is that the importance of our highways has reached the point where it requires the attention and administration of a National Highways Commission.

The sentiment is strong that both our legislators and the public have reached the place where the development of good roads cannot be stopped, and in view of that fact the most rational course is to so direct such a move that the maximum benefit may be realized. This it is believed, can only be brought about through the appointment of a National Highways Commission. Both Fourth Assistant Postmaster Blakslee and Roy D. Chapin, former chairman of the highways transport committee, strongly favored the development of national highways by the Federal Government. Chapin urged the necessity of adequate regulation of rural motor express lines which might use such highways, and came out in favor of exclusive franchises for individual lines. He carried the matter up a point further by suggesting that the National Highway Commission should have as one of its jobs the investigation of the use of public roads with a view to educating the public to their advantages and stimulating their use.

At a preliminary meeting of the Association of State Highway Officials action was taken empowering a committee to prepare a bill comprehensively covering the entire road program and advocating the appointment of a National Highways Commission. In the meantime this association will get behind the matter of Federal aid for state road building.

At to-day's session George M. Graham, president of the Pierce-Arrow Motor Car Co., will present a draft of a uniform vehicle law to cover both motor and horse drawn vehicles and including regulation, registration, weights and so forth. The measure is intended to eliminate present difficulties when vehicles cross state lines and thereby become subject to entirely different sets of state laws. Following is the text of a resolution presented before the meeting to-day which typified the prevailing sentiment. It will come up for action at to-day's session:

Resolved that a Federal Highway Commission be created to promote and guide this powerful economic development of both highways and highway traffic and establish a national highways system.

Be it further resolved that the present appropriations for Federal aid to the States be continued and increased and the States be urged to undertake extensive highways construction so as to keep pace with the development of this country and its transportation needs.

Be it further resolved, that all Governmental aid with respect to highways be administered by the Federal Highways Commission.

—

Patternmakers' Wage Scale Agreed

WASHINGTON, Dec. 12—The National War Labor Board, following the review of the case between the Patternmakers Association of Detroit, and the 19 firms involved, which include Maxwell Motor Co., Swedish Crucible Steel Co., Wolverine Pattern Works, and 16 other pattern companies, has ordered a wage scale of 95 cents per hr., dating from Aug. 29, 1918, to the journeymen patternmakers, with the recommendation that this rate be increased to $1 per hr. following Nov. 22, 1918, actual payment to be made accordingly not later than Jan. 1. The board further suggested that both employers and employees be governed by the right of workers to organize in unions and bargain collectively and the right of employers to organize associations and bargain collectively. That employers should not discharge workers for membership in trade unions. That workers should not use coercive methods or measures to induce people to join their union. That in establishments where union shops exist, they be continued and the union standard maintained throughout.

—

New Washington Section S. A. E. Criticizes Army Truck Methods

WASHINGTON, Dec. 11—Col. James Furlow presided at the first meeting of the newly established Washington section of the Society of Automotive Engineers held to-night.

A. A. Gloetzner, chief engineer of the Covert Gear Co., who was a member of the Commission sent to France to aid the A. E. F. Motor Transport Corps, told of truck experience overseas and criticized the methods of shipment, the shortage of trucks and the scarcity of skilled drivers. He stated that 214 makes of trucks embodying 600 types and more than 4,000,000 parts formed the American Army equipment and that it was almost impossible to provide efficient repair service.

Trucks in great numbers, said Gloetzner, were always laid up waiting for repairs; thousands were smashed owing to the fact that they were carried overseas as loose deck cargo and many were ruined through the ignorance of their drivers. He added that trucks played a vital part in winning the war, instancing the fact that at Chateau Thierry 81,000 men were hauled 175 miles in 32 hr. in convoys of as many as 500 trucks each.

—

Roy D. Chapin Resigns from Highway Transport Committee

WASHINGTON, Dec. 11—*Special to* AUTOMOTIVE INDUSTRIES—Roy D. Chapin has resigned as chairman of the Highways Transport Committee, a position he has held for more than a year. He is leaving immediately for Detroit to take up again his duties as president of the Hudson Motor Car Co. His work on the Highways Transport Committee will be taken up by John S. Craven. George H. Pride has also resigned from the committee.

Automotive Industries

Truck Parts Makers' Position Critical

Heavy Stocks Have Been Bought and Paid For—Government Settlement Delayed

WASHINGTON, Dec. 10—The situation with truck parts makers is particularly critical inasmuch as many of them, after receiving their orders for the last series of 25,000 B trucks, purchased large quantities of supplies for which they have paid and settlements for which will probably not be made by the Government for 6 or 8 months. This means that unless a part of the order for this last series of B trucks is revived, and at least 7500 allowed to be made, parts makers must wait until probably the summer or fall of 1919 before they can receive the money they have invested in anticipation of Government work.

In order to overcome this the parts makers and truck assemblers have organized and are placing their case before Government authorities and particularly before the Motor Vehicle Section of the Quartermaster Department. There are reports current that orders for 7500 B trucks applying to the last series may be revised, but there has been no action in this connection yet.

—

Selden Revises Truck Prices

ROCHESTER, N. Y., Dec. 11—The Selden Truck Sales Co. has revised its present list prices, the new schedule coming into effect on Jan. 1, 1919. Present and new chassis prices follow:

Model	New Price	Present Price
TXR 1-ton; int.-gear drive..	$1,900	.....
TWL 1-ton; worm drive.....	2,200	$2,100
JCB 2-ton; int.-gear drive..	2,750	.....
JWB 2-ton; worm drive.....	3,050	2,950
NL 3½-ton; worm drive.....	3,850	3,650
DL 5-ton; worm drive.....	5,000	4,950

—

War Industries Board to Quit

WASHINGTON, Dec. 6—That the War Industries Board will be completely abolished on Jan. 1, 1919, was made evident by the release of Bernard M. Baruch's letter of resignation by the White House. In this letter Mr. Baruch advised President Wilson that the War Industries Board would terminate all activities on Jan. 1, turning over those divisions which should continue permanently. The Conservation Division, which has had charge of such work as limiting the sizes of automobile tires, will come under the Department of Commerce. The division on petroleum and its products will be turned over to the Bureau of Mines. It can be expected, therefore, that all restrictions on industries of whatever nature excepting those which were formulated by the Conservation Division, will be terminated and that 100 per cent production can be engaged in by all industries and companies.

—

Tractor Makers Free from Restriction

All Curtailments of Material and Limitations on Manufacture Are Removed

DETROIT, Dec. 11—B. F. Sprankle, president of the American Tractor Association, has received a wire from Judge Edwin B. Parker, Priorities Commission, Washington, D. C., which authorizes him to notify the members of the American Tractor Association that all restrictions on the manufacture of tractors and all curtailments on tractor material have been removed from and after Dec. 9.

—

Control of Steel to Cease Jan. 1

WASHINGTON, Dec. 12—The Government control of steel, including price regulations, will be entirely removed Jan. 1, the War Industries Board announced definitely to-day, following conferences with the American Iron & Steel Institute. Steel prices after that date will be determined by the industry on the former competitive basis. Foreign shipments of steel and the present embargoes are likely to be kept up.

—

80,000 Trucks Sent Abroad

NEW YORK, Dec. 9—Approximately 80,000 American motor trucks have been sent abroad, and it is believed unlikely by the National Automobile Chamber of Commerce that any of these will be returned to this country. At present there are about 45,000 trucks en route or on order for the Government and about 7500 in use by the Army and Navy in this country. The N. A. C. C. believes that few, if any, of these will be offered for sale, and that if they are offered the sales will be widely distributed to prevent disturbing conditions in any one locality. Similarly, it is believed that no more passenger cars will be required by the Army and equally unlikely that any of those now in use will be disposed of.

Truck Orders Not Canceled

Post Office Increases Requisition from 10,500 to 15,700 Vehicles

WASHINGTON, Dec. 10—The Post Office Department has increased its requisition with the War Department for motor trucks from 10,500 to 15,700, and as a result it is now expected that the orders for commercial trucks placed with the Locomobile, Pierce-Arrow, Packard, Garford and White companies will not be canceled.

Truck orders placed by the Government and still in force include the second series of B 3-ton standardized trucks, totaling 8000; trucks for Nash Quads and 4-wheel-drive trucks, totaling 12,000; orders for Locomobile, Pierce-Arrow, Packard, Garford and White, total approximately 18,000 trucks, and other contracts for 10,000 trucks placed with the Federal, Gramm-Bernstein, Hurlburt, International Harvester, Kelly-Springfield, Moreland, Republic, Standard and Velie companies. It is now reported that the 18,000 commercial trucks on order with the first five named companies will stand and the 10,000 on order with the last named concerns will be allowed to run to Jan. 1, 1919, and those not completed at that time will be canceled. It is also expected that the orders for Nash and Four-Wheel-Drive trucks will be reduced somewhat.

The contract for the 800 B trucks will be completed.

Many of the truck manufacturers and also a number of the parts makers who have been particularly interested in the standardized trucks are facing serious troubles if cancellations are further engaged in.

—

Appropriation for Post Office Aerial and Truck Services Recommended

WASHINGTON, Dec. 10—An appropriation of $2,185,000 for purchase of airplanes and maintenance of air line mail service for the Post Office Department is recommended in the Post Office Appropriation Bill reported to the House to-day. This is an increase of $1,185,000 over the $300,000 originally estimated by the Department. The committee also recommends an appropriation of $1,000,000 for motor truck mail service, which is $700,000 more than the $300,000 authorized in the act of June 2, 1918. The Post Office authorities asked for $1,500,000 for motor truck service.

Highways Transport Work Reviewed

Annual Report of Council of National Defense Deals with Automotive Section

WASHINGTON, Dec. 6—The annual Report of the Council of National Defense which is just out includes a review of the work of the Highways Transport Committee, the Automotive Products Section, the Commercial Economy Board, and other divisions, some of which were later in the year made a part of the War Industries Board. The review of the work by the Highways Transport Committee includes complete discussion of the assistance between that committee and the War Department in convoy service, its development of highways transport resources, activities for snow removal from highways, expansion of store-door delivery and return loads bureaus, and its co-operative work with the Food Administration in the development of rural motor express.

Control of Products Section

The Automotive Products Section, the report states, controlled during the year the allocation of Government business and purchases of the Government and the Allies of motorcycles, motorcycle side cars, motor cars, motor trucks, motor truck bodies, motor truck tractors, motor truck trailers, armored cars, military tractors, military tanks, marine gas engines, automotive accessories and airplane parts.

The report tells in detail of the development of the class B truck, drawings of which were started in December, 1917, as a result of the co-operation between the Quartermaster Corps and the Society of Automotive Engineers.

The first two of these trucks, says the report, were completed and run on their own power to Washington on October 10, arrived October 14, and were accepted by the Secretary of War on October 19. The Automotive Products Section advised the Government and the Allies as to the allocation of more than $400,000,000 worth of apparatus.

Shortages Caused Trouble

During the year two shortages occurred, one of magnetos for trucks, tractors and airplanes, due to shortage of platinum, and, second, a shortage of wireless apparatus, due to lack of mica. Producers, importers, jobbers and users of this were called together and steps were taken to conserve the platinum, while at the same time domestic mica was discovered which was equivalent to any India mica for electrical apparatus.

On April 18, says the report, the Conservation Division arranged with the rubber industry for a reduction in the numbers, sizes and types of automobile tires from 287 to 282 immediately, and by gradual steps during the next year to 9 sizes and types. This, adds the statement, will result in economy in production and make a large reduction in the quantity of inactive stocks in the hands of manufacturers and dealers.

U.S. October Exports Show Decrease

Limitation of Ocean Transport Undoubtedly Chief Cause—Improvement Anticipated

	Cars	Value	Trucks	Value	Parts
			1918		
Oct..	1,708	$1,881,462	737	$2,192,556	$3,700,687
Sept.	3,305	2,593,236	1,280	3,215,206	3,441,758
			1917		
Oct..	5,536	4,581,127	1,359	4,422,268	3,045,192

WASHINGTON, Dec. 9—Exports of automotive products—cars, trucks and parts—during the month of October were valued at $7,774,705 as against $9,250,200 for September and $11,848,577 for the month of October, 1917.

There are several reasons for the drop. Consignments which were shipped in October were, obviously, ordered long before there were indications of a cessation of warfare, and even during the month of shipment ocean transport was much restricted, the bulk of available tonnage being diverted to the carrying of men, munitions and food. This was the case, in a measure, a year ago, when our exports were much greater than recently. On the other hand, a year ago there was a much more urgent need of both cars and trucks for war service and to relieve railroads of congestion.

Investigation has shown that the falling off in automotive products export has not been caused by lack of orders but by the strict limitation of shipping facilities.

Exports of Automotive Equipment for October and Nine Previous Months

	Month of October				Ten Months Ending October,			
	1918		1917		1918		1917	
	No.	Value	No.	Value	No.	Value	No.	Value
Airplanes	1	$800	.....	.....	29	$418,255	138	$1,065,707
Airplane parts	.....	790,262	.....	$1,028,027	.....	11,162,210	.....	4 077 741
Commercial cars	737	2,192,556	1,359	4,422,268	8,434	21,450,901	12,176	31,624,278
Motorcycles	626	157,112	460	97,731	8,072	1,889,580	12,499	2,604,878
Passenger cars	1,708	1,881,462	5,536	4,581,127	33,576	31,498 013	54,303	41 671,965
Parts, not including engines and tires	.....	3,700,687	.....	3 045,192	.....	29,248,820	.....	24,137,118
Total (trucks, cars and parts value only)	.....	$7,774,705	.....	$12,048 587	.....	$82,197,734	.....	$97,433,361
ENGINES								
Automobile gas	3,297	$417,177	2,714	$311.171	26,321	$3,449,161	27,066	$3 073,241
Marine gas	310	296,021	631	134,206	4,350	2,297,736	8,886	1,728,305
Stationary gas	2,892	368,080	1,534	187,438	24,361	2,857,350	22,606	2,601,364
Tractor gas	1,214	1,586,188	1,799	1,608,680	20,941	22,184,240	10 222	12 896,414
Total value	.....	$2,667,466	.....	$2,234,495	.....	$30,838,487	.....	$20,299,324

EXPORTS BY COUNTRIES OCTOBER, 1918 — TEN MONTHS ENDING OCTOBER, 1918

	Passenger Cars		Trucks		Passenger Cars		Trucks	
	No.	Value	No.	Value	No.	Value	No.	Value
Argentina	2	$14,345	.....	.....	1,433	$1,496.575	43	$39,863
Australia	73	73,897	.....	.....	3,312	2,803,526	.....	.....
British India	1	6,648	.....	.....	57	50.146	.....	.....
British South Africa	103	111,707	.....	.....	915	774,979	.....	.....
Canada	397	352,754	115	$152,519	8,936	6 778 073	1,349	1,658,263
Chile	9	16,341	.....	.....	1,582	1,998,422	.....	.....
Cuba	45	88,644	41	67,393	1,638	2,215,257	471	962,641
Denmark	30	54,047	.....	.....	32	58,147	.....	.....
Dutch East Indies	218	229,808	.....	.....	927	1,064,047	.....	.....
France	10	27,238	392	1,552,520	997	1,115,328	2,564	9 428,955
Mexico	83	82,827	.....	.....	1.668	1,253,030	.....	.....
New Zealand	48	48,697	.....	.....	1,207	1,022,231	.....	.....
Norway	55	98,415	.....	.....	181	399,989	.....	.....
Philippine Islands	135	129,607	.....	.....	1,632	1,400,523	.....	.....
Russia in Asia	.....	.....	15	18,200	.....	.....	15	18,200
Russia in Europe	.....	.....	.....	.....	10	8,325	2	5,454
Spain	50	93,290	.....	.....	723	899 376	.....	.....
United Kingdom	51	24,300	42	144,290	391	983,344	2,222	6,585,105
Uruguay	27	39,730	.....	.....	1,216	735,047	.....	.....
Other Countries	371	389,079	132	257,634	6,889	6,441,648	1,768	2,752,420
Totals	1,708	$1,881,462	737	$2,192,556	33,756	$31,498,013	8,434	$21,450,901

October Exports from New York

Great Falling Off in Cars and Trucks — Parts Show a Slight Increase

NEW YORK, Dec. 9—October exports of automotive products from this port are disappointing when compared with those for the previous month. In September the total value of cars, trucks and parts exported was $4,721,391; the figure for October being but $3,266,216. This represents a drop of $1,455,175, equal to approximately 30.8 per cent.

Passenger cars show a decrease of almost 43 per cent in number for the month and their value is nearly 30 per cent below that of the cars exported in September. Trucks have fallen off to an even greater extent, the reduction being over 61 per cent in number and over 57 per cent in value. Parts have increased 22 per cent in value in comparison with September figures.

Under present shipping conditions it is hardly fair to compare any individual month with another. As a matter of fact it would be quite correct to state that at this time our exports are restricted by lack of transport rather than by any shortage of orders.

In considering the October figures it is of interest to observe that automotive products have been exported during the month to Iceland, Morocco, Japanese China and Portuguese Africa. Russia in Asia and Turkey in Asia are also buyers for the first time for a considerable period.

65,870 Cars in Kentucky

LOUISVILLE, Dec. 6—The motor car in Kentucky experienced its most prosperous year in 1918, despite the war and restrictions on production. The actual increase in registration was 18,454 for the year. There are now 65,870 motor vehicles in use in the Bluegrass State. At present there is one car for every thirty-five persons in Kentucky.

To give an idea of the growth in Kentucky the passenger car and truck registrations by years since 1911 are given herewith:

1911	2,868	1915	19,500
1912	5,147	1916	31,700
1913	7,210	1917	47,416
1914	11,746	1918	65,870

500-Mile Race May 30

INDIANAPOLIS, Dec. 7—There will be a 500-mile race at the Indianapolis Motor Speedway this coming year. May 30 is the date; $50,000 is the purse. This announcement comes from C. G. Fisher, J. A. Allison and A. C. Newby, owners of the Indianapolis course.

AUTOMOBILE, TRUCK AND PARTS EXPORTS FROM NEW YORK FOR OCTOBER

	Cars		Trucks		Parts
	No.	Value	No.	Value	Value
Argentina	2	$14,345	..	.....	$52,247
Australia	..	.....	..	.....	25,616
Barbadoes	..	.....	..	.....	705
Bolivia	..	.....	..	.....	350
Brazil	19	22,764	..	.....	9,649
British East Africa	..	.....	..	.....	369
British East Indies	..	.....	..	.....	3,331
British Guiana	3	4,490	..	.....	6,750
British India	1	6,648	..	.....	21,200
British South Africa	103	111,707	7	$4,125	82,244
British West Indies	2	1,172	1	454	1,090
Chile	9	16,341	5	19,000	40,876
China	23	20,644	1	800	3,441
Colombia	4	3,601	..	.....	483
Costa Rica	..	.....	..	.....	527
Cuba	17	38,404	16	40,077	76,866
Danish West Indies	1	500	..	.....	303
Denmark	30	54,047	..	.....	774
Dutch East Indies	35	44,787	4	7,975	32,158
Dutch Guiana	..	.....	..	.....	259
Dutch West Indies	..	.....	..	.....	553
Ecuador	..	.....	..	.....	592
England	51	24,300	37	126,840	201,154
France	10	27,238	215	797,198	840,153
French Africa	1	1,885	..	.....	170
French West Indies	3	2,172	..	.....	1,762
Guatemala	..	.....	..	.....	.....
Haiti	1	1,800	..	.....	501
Honduras	..	.....	..	.....	168
Iceland	10	9,582	..	.....	1,023
Italy	1	800	..	.....	.....
Jamaica	1	1,022	2	800	1,796
Japan	2	1,470	..	.....	407
Japanese China	25	16,500	..	.....	.....
Mexico	13	15,490	..	.....	4,854
Morocco	..	.....	..	.....	96
Newfoundland	7	7,305	..	.....	291
New Zealand	..	.....	..	.....	368
Nicaragua	1	1,448	..	.....	41
Norway	55	98,415	8	18,000	19,259
Panama	2	2,550	14	18,512	3,133
Peru	17	26,269	..	.....	6,310
Philippine Islands	10	5,000	..	.....	.....
Portugal	1	3,743	..	.....	.....
Portuguese Africa	6	4,308	1	1,725	310
Russia in Asia	..	.....	15	18,200	.....
Salvador	..	.....	..	.....	.....
Santo Domingo	5	3,862	1	2,297	2,390
Spain	50	93,290	..	.....	5,568
Switzerland	1	1,646	..	.....	.....
Trinidad	..	.....	..	.....	4,641
Turkey in Asia	6	3,965	..	.....	3,764
Uruguay	27	39,730	..	.....	8,998
Venezuela	2	2,313	1	1,000	6,115
	557	$735,558	328	$1,057,003	$1,473,655

Modify Australian Import Rules

Exporters Must Give Value of Products "for Home Consumption"—Other Rules

WASHINGTON, Dec. 8—Passenger car and truck makers exporting to Australia should prepare immediately, states a commerce report, to comply with the requirements concerning invoices and customs declarations which go into force on Jan. 1, 1919. After that date all invoices for goods dutiable at an *ad valorem* rate from all countries other than China and Japan must contain a separate column showing the fair market value for home consumption in the country of export, at the date of invoicing to Australia, of similar goods in similar quantities. The heading of this column should be as follows:

Domestic value f.o.b. ("port of export" or "factory" or as the case may be) at date of invoicing to Australia, subject to .... per cent discount for cash and in(ex)cluding cost of domestic outside casing.

The prescribed form of declaration of value to accompany the invoice, as given in Statutory Rules No. 216 of 1918, varies only slightly from that given in Commerce Reports of Feb. 16, 1918, but it should be used in preference to that previously given, and for convenience it is here reprinted in full. Correction should also be made of paragraph 3 of the form of declaration printed on page 19 of Tariff Series No. 37 (Customs Tariff of Australia). The declaration is to be written, stamped, typewritten or printed on the back of the invoice.

The complete form of the declaration of value is as follows:

I, ... (here insert manager, chief clerk, or as the case may be), of ..... (here insert name of firm or company), of ..... (here insert name of city and country), the manufacturer or supplier of the goods enumerated on this invoice, amounting to ..... (here insert value), have the means of knowing and do hereby declare:

1. That the said invoice is in all respects correct and true;

2. That the said invoice contains a true and full statement showing the prices actually paid or to be paid for the said goods, the actual quantity thereof, and all charges thereon;

3. That the price shown in the invoice in a separate column represents the actual price at the date of this declaration of equal quantities of identically similar goods to any purchaser for home consumption in this country;

4. That no different invoice of the goods mentioned in said invoice has been or will be furnished to anyone; and

5. That no arrangement or understanding affecting the purchase price of the said goods has been or will be made or entered into between the said exporter and purchaser or by anyone on behalf of either of them either by way of discount, rebate, salary, compensation, or in any manner whatsoever other than as shown in the said invoice.

Dated at.....this.....day of.....19..

Witness..... Signature.....

In the case of goods covered by an invoice being consignment (not an outright sale), the following clause should be substituted for paragraph 2:

2. That the said invoice contains a true and full description of the goods, the actual quantity thereof, the amount debited therefor, and all charges thereon to free on board at port of shipment as known up to the date of invoice.

Report on Transport and Aviation

82,500 Trucks, 16,000 Cars and Many Trailers Completed for Army

WASHINGTON, Dec. 9—The annual report of the Secretary of War for the fiscal year ending June, 1918, includes in its statement reports on the Motor Transport Corps, tractors and aviation. The Motor Transport Corps personnel, states the report, totals 2700 officers and 77,000 men. This is exclusive of the Motors and Vehicle Division of the Quartermaster Corps, which is in charge of purchase and procurement. Automotive equipment carried over for the fiscal year 1918 amounted to $353,000,000.

The appropriations for motor transportation for the fiscal year ending June 30, 1919, totaled $886,000,000, of which $350,000,000 has been expended or will be expended on contracts which cannot be canceled. A further expenditure of $29,000,000 will be necessary for the repair-shop and equipment program and additional expenses incident to demobilization and liquidation of the vehicles left on hand are estimated at $6,000,000. Equipment which will be carried over into the fiscal year 1920 represents an expense of $732,000,000.

55,000 Motor Vehicles Overseas

To date, states the report, 82,500 standardized and commercial types of trucks, 16,000 motor cars, 27,000 motorcycles, 22,000 bicycles and a great number of trailers have been completed for the Army. There are on hand overseas more than 55,000 motor vehicles. Seventeen thousand five hundred motor vehicles were shipped to the American Expeditionary Forces in October, while there were available for shipment on Nov. 1, 1918, 12,000 additional motor vehicles.

The convoy service of the United States, although formed primarily for training purposes, states the report, has since its organization transported more than 14,500 trucks overland, a greater part of which carried freight in the shape of spare parts and motor equipment.

The Motor Transport Corps had on hand at the time of the report a balance of $501,698,824 from appropriations.

Truck production for the fiscal year of 1918 totaled 82,490 trucks and other motor vehicles amounted to 65,482.

That section of the report dealing with aviation, after enumerating figures which have already been published relative to production, states that at the cessation of hostilities there were 17,000 cadets graduated from ground flying schools, 6528 men training as aviators, 8602 reserve military aviators graduated from elementary training schools and 4028 aviators who had completed the advanced training course. In addition 14,000 mechanics had been graduated from training schools.

On Sept. 30, 1918, there were 32 squadrons composed entirely of American personnel at the front, of which 15 were pursuit, 13 observation and 4 bombing.

Reports of air casualties show that 2 aviators lose their lives in accidents for each aviator killed in battle. The report on battle fatalities up to Oct. 4 were 128 and the overseas accident fatalities 244, while the fatalities at training fields in the United States totaled 262. The Air Service, which in April, 1917, comprised 65 officers and 1120 men, at the signing of the armistice totaled 190,000, of which there were 20,000 commissioned officers, 6000 training cadets, 164,000 enlisted men and 11,000 other flyers. The Air Service constituted over 5 per cent of the total strength of the Army.

—

Vincent, Vindicated, Returns to Packard

Exonerated and Thanked for Services in Presidential Announcement

WASHINGTON, Dec. 9—Commended by the President of the United States for his services to America in time of national need, and vindicated on all his acts in the speedy production of a military aviation engine for the United States forces, Lieut.-Col. Jesse G. Vincent has received an honorable discharge from the Army and has returned to take charge of Packard engineering, the work he left in June, 1917, to enter Government service.

"The President believes that the two gentlemen concerned, Lieut.-Col. Geo. W. Mixter and Lieut.-Col. J. G. Vincent," says an executive announcement made public at the White House on Dec. 3, "were entirely innocent of any improper or selfish intentions, that their guilt was only technical, and that their services to the Government, which have been of the highest value and of the most disinterested sort, deserve a cordial recognition."

—

Overland Prices Drop

DETROIT, Dec. 6—The Willys-Overland Co. has decreased the prices of all its models, excepting the No. 88 eight-cylinder passenger car. The new price list follows:

Model	New Price	Old Price
90, Touring	$985	$1,095
Willys-6, Touring	1,625	1,775
88-4	1,725	1,925
90, Sedan	1,495	1,665
88-4, Sedan	2,750	2,950
88-4, Coupe	2,650	2,850
90, Delivery	1,000	1,045

—

Allen Prices Down $100

FOSTORIA, OHIO, Dec. 7—The Allen Motor Co. has reduced the prices of its cars $100 each, effective Dec. 2. New and old prices follow:

Model	New Price	Old Price
41	$1,195	$1,295
Sedan	1,695	1,795

Goodyear Profits Are Record

Gross Sales for Year Amount to $131,000,000—Net Profits Are $15,388,190

AKRON, Dec. 7—Although President F. A. Seiberling in his report of the year's business ending Oct. 31, 1918, pointed out to the stockholders of the Goodyear Tire & Rubber Co. that the net profits were materially reduced by the fact that Government business (approximately 15 per cent of the total volume) was handled at a considerably lower percentage of profit than was the company's regular business, he was able to show gross sales of $131,000,000 and net profits of $15,388,190.74.

Preceding year's gross sales were $20,000,000 below the 1918 figures and profits were $14,044,216.10.

Examination of the balance sheet discloses the fact that a year ago the company had in excess of $15,000,000 notes payable outstanding. This item has been liquidated by the sale of $15,000,000 of 8 per cent preferred stock to over 16,000 stockholders composed almost entirely of customers and employees.

At the annual meeting all the directors were re-elected, as follows: F. A. Seiberling, C. W. Seiberling, G. M. Stadelman, F. H. Adams, P. W. Litchfield, H. B. Manton and J. P. Loomis. The directors in turn elected the following officers: F. A. Seiberling, president and general manager; C. W. Seiberling, vice-president and manager of purchases; G. M. Stadelman, vice-president and manager of sales; P. W. Litchfield, vice-president and factory manager; A. F. Osterloh, secretary; W. E. Palmer, treasurer and assistant secretary; H. J. Blackburn, assistant treasurer.

Assets

	1918	1917
Plant and property	$29,785,045.61	$24,942,790
Patents, trademarks and designs	1.00	1
Securities owned	5,363,502.69	1,706,426
Pfd. stock in treasury	149,636.24	18,700
Notes receivable	1,625,650.43	1,033,640
Inventory	30,507,966.81	28,495,624
Accounts and notes receivable	15,455,263.25	16,384,333
Cash	6,344,490.11	3,783,354
Suspended assets	208,323.98	175,587
Advances to cus., etc	3,488,956.62	5,218,217
Prepaid rentals, interest, ins., etc.	690,181.46	803,920
	$93,619,018.20	$82,562,592

Liabilities

	1918	1917
Common stock	$20,466,800.00	$20,278,620
Preferred stock	38,783,800.00	24,393,700
Notes payable	.....	15,410,800
Purchase accounts payable	5,687,407.36	4,864,761
Sundry other accounts payable	1,432,045.71	850,968
Balance unpaid for Liberty Bonds	571,500.00	.....
Dividends accrued and payable	392,530.05	.....
Reserves		
For doubtful accounts	439,769.28	707,032
For insurance on branch stocks	31,335.82	45,000
For depreciation	5,096,473.90	3,248,030
Surplus	20,717,356.08	12,763,681
	$93,619,018.20	$82,562,592

Fordson Men Attend Sales Conference

Over 100 Distributers Meet at Tractor Plant to Discuss Prospects and Policy

DETROIT, Dec. 9—A 100 per cent representation of Fordson distributers attended the sales conference at the Fordson tractor plant in this city on Thursday, Friday and Saturday of last week. Of distributers and executive men in their employ more than 100 were here. The conference was devoted almost exclusively to an open discussion of the prospects for the coming year and the policy which would be pursued by the distributers' association in handling it. No definite action was taken on many of the things affecting policies, but committees were appointed from among the members of the association which will take these matters under investigation and report conclusions to Henry Ford & Son for final decision.

Probably, as far as the distributers are concerned, the official recognition of the association by Henry Ford & Son was the most important outcome of the conference. C. E. Sorensen, in addressing the conference, said that the firm of Henry Ford & Son was heartily in accord with the principles underlying the organization, and that henceforth it should receive the approval and hearty co-operation of the company. Matters affecting the distribution of the tractor will be referred to the association and handled through committees, subject to the approval of the officials of the company, who are recognized as honorary members of the association and who constitute practically an executive committee with final authority.

It was decided at the conference that there will be no immediate change in the price for the Fordson tractor, which will continue at $750, f.o.b. Dearborn, as heretofore. About the only change from past custom in this respect was the agreement by Henry Ford & Son to ship tractors in carload lots hereafter, payable upon delivery and not with sight draft attached to bill-of-lading, as has been the custom.

The kind and quality of service which the dealers shall render on Fordson tractors was discussed exhaustively. The real purpose in calling the conference to Dearborn instead of the meeting which had been scheduled for Chicago was to impress upon the distributers as a body the obligation that they and their subdealers owed to the country at the present time to do all they could to further agricultural operations.

The consensus of opinion of the distributers was that free service should be limited practically to delivery and to starting the tractor with preliminary instructions of the farmer in operation, subsequent service to be charged for at rates depending upon local conditions. The recommendation was made that in all cases where it was necessary to supply spares, the local service man make an investigation to determine whether the breakage was due to the fault of the operator or to mechanical defects. This would determine the charge which should be made.

Regarding the equipment which will be used with the tractor, while it was not made conditional upon the distributers, still it is understood that if they sell equipment at all, it will be only such as has received the approval of Mr. Ford. An implement committee was appointed to consider the merits and claims of all operative equipment, both in the line of tillage tools and belt power machinery, and then to recommend the adoption of such implements as meet the requirements. Final decision will rest with the officials of the factory after considering the recommendation of the committee.

Regarding the character of the dealers who had been most successful in the distribution of tractors, the opinion was almost unanimously expressed that the Ford motor car dealers had proven their efficiency in this respect. They are prompt and efficient in service, loyal to the company and enthusiastic.

Ford Entertains Visitors

The visitors were entertained by Henry Ford & Son with a dinner at the Detroit Athletic Club, followed by a motion picture entertainment showing the activities of the Ford organizations, a dinner at the Hotel Statler and an evening at the Garrick Theater.

As indicative of the production at the Fordson plant, the total number of complete tractors turned out for the week ending Dec. 7 was 852. These were divided into daily production as follows: Monday, 153; Tuesday, 174; Wednesday, 164; Thursday, 184; Friday, 177. In addition, 791 transmission housings, 582 engines, 797 rear axles and 778 front axles were produced.

—

After American Agencies

WASHINGTON, Dec. 7—The Bureau of Foreign and Domestic Commerce, Department of Commerce, has requests from Colombia for the agency for automobiles and trucks. Further information can be secured by addressing the Department of Commerce, referring to Foreign Trade Opportunity No. 27743. The Department also has an inquiry from Peru, desiring an agency on a commission basis for the sale of farm tractors, automobiles, accessories and oils. Further information can be secured from the Bureau of Foreign and Domestic Commerce by referring to Foreign Trade Opportunity No. 27748.

—

Mitchell Prices Are Dropped

RACINE, Dec. 9—The Mitchell Motors Co. has revised the prices of its cars and returned them to pre-war basis as follows:

Model	New Price	Old Price
B-40	$1,275	$1,465
C-42	1,525	1,735

U. S. Russian Bureau Organized

War Trade Board Forms Company to Aid in Stabilizing Economic Situation

WASHINGTON, Dec. 9—The War Trade Board of the U. S. Russian Bureau, Inc., is a company which has been organized by the War Trade Board at the direction of the President for the purpose of helping the Russians to help themselves in stabilizing the economic situation in Russia. It has a capital stock of $5,000,000, all of which has been issued and fully paid in cash out of Government funds. The stock is owned in its entirety by the United States Government.

The company will engage in the business of exporting to Russia and Siberia agricultural implements, shoes, clothing and other commodities which the Russian population need, bringing back Russian and Siberian raw materials in return. The company thus is intended to aid in supplying the needs of the people of Russia, in encouraging Russian production and trade, and assisting in the marketing of Russian products in America and their exchange for American goods.

One of the chief objects which the company will have in view will be the encouragement of private capital to engage in trade in Russia and Siberia as shipping becomes available for the purpose. Its policy will be to co-operate with, encourage and promote such trade with Russia as will assist in the rehabilitation of her economic life, and to cover by its direct operations only such portions of the field as cannot at present be served readily by private enterprise.

The company has already begun the transaction of business by the dispatch of three vessels from the Pacific Coast to Vladivostok carrying commodities which its representative in Siberia has designated as being most urgently needed there.

By addressing the Russian Bureau persons interested in Russian trade may receive more detailed information as to the commodities most needed by Russia and the commodities likely to be available for export from Russia. Additional vessels will from time to time be scheduled, and shippers are urged to file applications for licenses to export to Russia such commodities as they know to be needed.

The head office of the Russian Bureau is in the War Trade Board Building at Washington, D. C. The board of directors of the company consists of the members of the War Trade Board. Hon. Vance C. McCormick, chairman of the War Trade Board, is president of the company; John Foster Dulles is secretary and treasurer, and Henry B. Van Sinderen is acting manager. The directors are Vance C. McCormick, Thomas L. Chadbourne, Jr., Edwin F. Gay, Albert Strauss, Alonzo E. Taylor, J. Beaver White and Clarence M. Woolley.

Incorrect Hitching Neutralizes the Work of the Tractor

Speakers at the Meeting of the Minneapolis Section S. A. E. Emphasize the Importance of Proper Hitches and Plow Implements for Power Farming

MINNEAPOLIS, Dec. 5—The tractor man doesn't realize the importance of the implement, according to F. N. G. Kranick, speaker at the meeting last night in the Hotel Radisson of the Minneapolis Section, S. A. E. Mr. Kranick is in charge of the implement division of the Hyatt Roller Bearing Co., Chicago, and is most of the time in the field. His subject was: "Drawbar Implements and Hitches." Prof. J. L. Mowry, of the University of Minnesota, presided.

"The tractor is an incidental means to the end. If there were not another tractor in the world we would get along, but without implements we would starve," said Mr. Kranick as a basis of his attitude to the subject. In brief the speaker said:

"Implements to go with tractors as a whole apparently have not had the consideration due them. It is really the implement that does the work the farmer has to do. Really it is the work that is being done by the implement that makes the success for the tractor as a whole. It is no uncommon thing to see tractors sold for work done by the plow. The implement is part of this big problem that we have to work out. I believe the sooner we all realize the implement has an important function in common with the tractor the better it will be for the industry as a whole.

Hitching Cause of Trouble

"Much of the trouble is the way the implement is hitched. The implement really does what we have to do. The history of nations is the history of its farm machinery, which governs the growth of agriculture which we must have to live. Since 83 per cent of farm work is machine work, farm machinery must receive more consideration from tractor makers. The implement really is first. The tractor is a means to an end to get more out of the implement and to use larger units and do more in the same time. Due to the development of machinery one man can do the work of 3 men in 1880.

"To-day is the fourth period of agriculture, or farm power. Farm power is part of agriculture. Plowing is "the peak of the load" in agriculture. It takes more power to plow the wheat fields than the power of all the industries for the same period.

"The tractor is doing away with the slow work of the walking plow. The type of plows is not varied so much as before. One manufacturer told me he had had 50 types of bottoms to fit the territory in which they were sold. With the tractor this has simmered to four. Many manufacturers have the flexible beam type, and there is the rigid beam mounted on one frame and they travel together. It is found that where land is irregular and a constant depth is required the flexible type gives best satisfaction. It is harder to adjust and as it comes knocked down requires a good man to set it up.

"The rigid beam to-day is quite simple. The bottoms vary with what the farmer has to do. A plow has a certain work to do—to make the mold board such a shape as to turn one particle of the soil on another and mellow it. Sometimes with use of the stubble bottom instead of the general purpose the quality of the plowing is affected favorably.

"The hitch frequently defeats all the work of the tractor manufacturer. At the Salina demonstration this was apparent at quite a distance, as from the top of a stack, whence it was quite evident. The problem is to know just where to hitch to get the best results.

Implement Should Be Watched

"When we get a tractor with plows in the field we are apt to watch the tractor and overlook the implement altogether. Ordinarily of the draft on a plow 55 per cent is used to cut the furrow, 35 per cent in friction and 10 per cent to lift the load of the total draft. It is important that the plow run true and it is a good scheme to know when it is running right. The load on all three of the wheels of the plow should be equal, and whether this is true can be found by holding to see whether the rear wheel, which is usually the wrong one, slips on the ground. The tractor operator can easily adjust the rear wheel. To give the tractor a good show have the proper hitch and proper adjustment of the plow at tractor demonstrations.

"The number of plows a tractor can pull is a problem. In some places it is 3 lb. per sq. in. per furrow section, and in Illinois 20 lb. and in sections in the West twice that.

"It is difficult to find an operator who understands the hitch of the plow. It is important that the plow is set so the tractor can do its very best, so two-plow tractors in cases can pull three plows. The center line of draft on plows is often talked about as a mystery. Some people have assumed the center line of draft is 2 in. on the inside of the land side of the plow, or the point of resistance.

Rather than to assume this Professor White made tests which I witnessed with a drawbar hitched from one wheel on the outside to a wheel on the inside with holes every 2 in., with a dynamometer, to see where the pull was easiest. It ran lightest when hitched the poorest, to one side, but the quality of the plowing was awful. It revealed the importance of getting two units coupled up in harmony. This shows the engineers should give the unit consideration in the field as in the shop on the brake. What they do in the field is the final analysis to the whole thing.

"Never in public tests is any record kept of draft, so far as the hitch is concerned. This is important because one tractor can have a real good performance and a real poor performance, according to the test. If the manufacturer publishes figures of a test this item of hitch should be part of it.

"If a plow is set properly nine-tenths of the troubles of plowing will be eliminated. The industry as a whole will gain more if it gives more consideration to what is the tractor hitch to suit the implement."

Center Line of Draft

In reply to a question from A. W. Scarratt as to where he found the center line of draft with the experiments, Mr. Kranick said the figures were so different from what they expected to find that it threw the whole thing into the air. They tried to find the point of resistance with the plow.

It was a little over 2 in. inside of the land side; for 2 plows 19 in., 3 plows 26 in., 4 plows 33 in. Professor Mowry asked what the effect was on the plow.

The speaker said that if the land side is rubbing on furrow there should be ⅛ in. to ½ in. clearance. The plow should not drag on the furrow so as to take the load off the wheels. C. F. Shoop asked what about higher plowing speed and what it is. Mr. Kranick said the manufacturers have no idea about it. Some had plowed 5 m.p.h., which hurt the tractor more than the plow. A general purpose bottom is better for high speed than stubble bottom. There is no speed set at which a plow should work for a good season's work, but 3 to 3½ miles steadily is good. One who plows along steadily gets along better. The S. A. E. standard of 2 1/3 miles is too slow. Plowing should really be 3 to 4 m.p.h. The average of the new light tractors is about 3 miles, but not for 3 or 4 plows. It all comes back to efficient speed of the tractor—the economic value as to whether fast or slow speed is the efficiency of the tractor, whether it will stand up.

—

More Money for Wisconsin

MILWAUKEE, Dec. 9—The Wisconsin Motor Mfg. Co., which in recent years has become one of the largest and best known manufacturers of passenger car, truck and aircraft engines in the world, has increased its capital stock from $1,000,000 to $2,000,000 in order to accommodate the growth of its business and to provide for future extensions of facilities and trade. Within the last year and a half the size of the plant at Forty-fourth Avenue and Burnham Street, in West Milwaukee, has been nearly doubled. Charles H. John is president and general manager, and A. F. Milbrath is secretary and chief engineer.

Seger Heads U. S. Rubber

NEW YORK, Dec. 9—Charles B. Seger has been elected president of the U. S. Rubber Co., succeeding Samuel P. Colt, who becomes chairman of the board of directors. Mr. Seger is president of the Union Pacific Railroad Co. and for the past two years has been a member of the board of directors and of the executive committee of the U. S. Rubber Co. Lester Leland, for many years vice-president of the U. S. Rubber Co., was elected vice-chairman of the board of directors.

—

Combs Enters Canadian Prest-O-Lite

TORONTO, Dec. 8—R. H. Combs has become the general manager of the new Canadian company organized as the Prest-O-Lite Co. of Canada, Ltd., which will perpetuate the service of the Prest-O-Lite Co., Inc., in the Dominion.

The new company starts business with a capital stock of $800,000. It also operates plants for the manufacture of Prest-O-Lite compressed acetylene at Shawinigan Falls, Que., at St. Boniface, Man., and at Merritton, Ont. The welding and cutting equipment is made and marketed from the Toronto plant. In addition warehouses and an office are maintained in Montreal and a sales office in Winnipeg.

—

Dr. Garfield Resigns

WASHINGTON, Dec. 6—Dr. Harry W. Garfield, Fuel Administrator, has tendered his resignation to President Wilson. The President accepted it. This announcement was made yesterday at the White House together with the statement that the Fuel Administration will continue, however, to operate until winter has passed. No announcement of modification of fuel restrictions or of any contemplated changes in the present policies of the Administration were made in connection with the statement.

—

Frank A. Storer has resigned as general manager of the Wire Wheel Corp. of America to return to his former activities in the foreign market field. The first of the new year will find him esconced as junior partner of the Argentine firm known as Storer & Co., with headquarters at 361 Calle Chacabuco, Buenos Aires, to re-engage in the business of importing American goods.

—

Rex W. Wadman, who has been doing special work for the Ordnance Department, U. S. A., has re-established his New York office at 16 Beaver Street.

—

St. Louis Picks Landing Field

ST. LOUIS, Dec. 8—The city officials last week designated a site in Forest Park for the airdrome and landing field of the airplane mail service which is to be established between this city and Chicago in January if the War Department can release to the Postoffice Department sufficient airplanes by that time.

Men of the Industry

Changes in Personnel and Position

Lonn Heads Falls Motor

MILWAUKEE, Dec. 9—At the annual meeting of stockholders of the Falls Motors Corp., Sheboygan Falls, Wis., the following officers and directors were elected: President, E. J. Lonn, head of the Great Western Mfg. Co., LaPorte, Ind.; first vice-president, P. A. Waller, Kewanee, Ill.; second vice-president, L. G. Blessing, of Bastian & Blessing Co., Chicago, and Muskegon, Mich.; general manager, G. G. Brandenburg, formerly of the Buda Co., Harvey, Ill. Directors—H. W. Ladish, Milwaukee; C. Testwuide and William Wilms, Sheboygan Falls. The Falls company is completing a new shop addition which will go into operation Jan. 1 and make possible a considerable increase in output. The addition represents an investment of more than $250,000 in plant and equipment. The company is bringing out a new tractor motor to supplement its line of passenger car and truck engines, which it has been making and marketing for more than 15 years.

—

L. E. Schumacher, who for the past 8 years has been chief inspector of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been promoted to works manager of the Krantz Mfg. Co., Brooklyn, N. Y., the latest subsidiary of the former company.

—

J. K. Mahaffey, who has been representing the Edison Storage Battery Co. in Washington in connection with Government business, has been appointed district sales manager of the Pittsburgh district.

—

Bertram Smith, for the past 3 years district sales manager of the Detroit district of the Edison Storage Battery Co., has been appointed assistant general sales manager, with headquarters at the main office, Orange, N. J.

—

Lieutenant Thurber W. Cushing has been transferred to the inactive list of the Field Artillery Officers' Reserve Corps, and has returned to his duties as vice-president and sales manager of the Maibohm Motors Co., Racine.

—

Homer Hilton, formerly with the Class Journal Company, has joined the Oshkosh Motor Truck Mfg. Co., Oshkosh, Wis., as sales manager.

—

Gard Gale has accepted the general sales managership of the Commerce Motor Truck Co., Detroit.

Toback Returns to New York

NEW YORK, Dec. 9—Samuel S. Toback, who some months ago left New York to become president of the Redden Motor Truck Co., Chicago, has returned to New York to become general sales manager of the Marmon Automobile Co. of New York. This company, which controls the Metropolitan distribution of Marmon cars, has just added similar distribution of the Hupmobile, which up to recently was handled by Charles E. Reiss. Toback will have charge of both wholesale and retail sales of both lines.

—

Lipsner Out of Air Mail

WASHINGTON, Dec. 7—Capt. B. B. Lipsner has resigned as superintendent of the Aerial Mail Service. Capt. Lipsner objected to the assignment of "novices" in charge of important air work, and stated, "I wish to resign and keep spotless my record as first superintendent of the Aerial Mail Service."

—

Alden Takes Horowitz's Place

WASHINGTON, Dec. 4—Col. H. W. Alden has become assistant to the Chief of Ordnance in charge of motors, including tanks, following the resignation of Louis J. Horowitz, who was the assistant to the Chief of Ordnance in charge of tanks during the war. Mr. Horowitz resigned his position to resume his duties as chief executive of the Thompson-Starrett Construction Co. He was in complete charge of the engineering, manufacturing and inspection of military tanks.

—

Pablo Homs has been appointed assistant foreign sales manager for the Cleveland Tractor Co., Cleveland, with offices at 44 Whitehall Street, New York. The countries to which he will give special attention in the distribution of Cleveland tractors are Russia, Scandinavia, Holland, Dutch East and West Indies, Spain, Portugal, Japan, China, Manchuria, Philippines and Corea.

—

Truck Show for Philadelphia

PHILADELPHIA, Dec. 7—At a meeting of the board of directors of the Motor Truck Association of Philadelphia it was decided that the association will hold a show in March, following the show of the Philadelphia Automobile Trade Association. The motor truck show will be held under the direction of a committee consisting of the officers and directors. J. D. Howley is president of the association.

—

Tractors for Snow Removal

HARRISBURG, PA., Dec. 7—For the first time in the history of Pennsylvania, tractors will be used for the removal of snow from the highways. The State Council of National Defense will turn over several of the state's big farm tractors used in the fields the past season for the use of the State Highway Department.

British Day at S. A. E.

Metropolitan Section Hears Paper on Transmission by English Engineer

NEW YORK, Dec. 11—To-day was British Day at the Metropolitan Section of the S. A. E., beginning with an afternoon reception to the Council of the Society at which the speakers and the nature of the subjects for the coming winter meeting, which has been postponed until February, were discussed, and ending with a combination British engineering talk and French movies in the evening, with a satisfying dinner, including cider, sandwiched in between. All three events took place at the clubhouse of the A. C. A.

The principal speaker was F. Leigh Martineau, a British engineer, associated with Hele-Shaw, who gave an interesting talk on hydraulic transmissions. Owing to sickness he had not been able to prepare as complete a paper as he wished, but he dealt clearly with the fundamentals governing the use of hydraulic transmissions in general and the construction and operation of the Hele-Shaw oil transmission in particular. illustrating the latter with lantern slides. His experience, which has extended over several years, has been largely with the application of oil transmissions to other than vehicle uses, such as ship-steering gear, hydraulic cranes and presses, but his vision of the future developments of this simple form of power transmission includes the vehicle field. As an example of its ruggedness the speaker referred to an oil operated press which had been in use in a French munition works from 1914 until 1917, working night and day throughout that period without any repairs or replacements. Some interesting results of tests for economy of hydraulic as compared with steam steering gears for ships were given, showing a great saving of fuel consumed and even an increase in the speed, owing to smoother ruddering, of the same ship when fitted with hydraulic steering.

Remarkable figures of efficiency in the operation of oil transmission when full power is transmitted over a small speed range were also given. There is the limitation, however, that if a great range of speed is required at the output end this efficiency is considerably lowered.

As an example of an application of hydraulic transmission where its superiority over other types is very marked mention was made of large hydraulic cranes in use at the munition plants in England and France. The advantages are especially noticeable in the lowering of heavy loads, near the maximum of the crane. In the hydraulic crane this can be accomplished with almost perfect control and without any vibration, whereas friction-controlled lowering is accompanied with great danger, owing to the impossibility of applying smooth braking effort.

In the absence of Major Crossley, who was to address the meeting, C. G. Griffin of the British Mechanical Transport made a felicitous speech in which he expressed the gratitude felt by the British engineers for the great services rendered by their American confrères in the mechanical work of the war.

Harold L. Pope, who has lately returned from a tour of the aircraft factories in France and England, recounted his experiences briefly.

The meeting closed with a visionary expression of the future work of the society by President Kettering.

Two New York Shows in February

Dealers' Association Will Hold Car and Truck Exhibits in Madison Square Garden

NEW YORK, Dec. 9—Instead of having no show New York is to have two shows. The old double-show days are coming back under the auspices of the Automobile Dealers' Association of New York City.

After much negotiation the dealers have secured the Madison Square Garden, where the motor show was born a score of years ago, and will put on shows for both cars and trucks. The passenger cars will be shown Feb. 1 to 8 and the trucks Feb. 10 to 15.

Those who used to attend shows under the Garden's vaulted roof will remember that extra floor space used to be secured by extending the balcony out over the main floor. This plan will be again followed, so that the floor space will be about as it was in the old days before the shows left the Garden to go to Grand Central Palace, which is now a military hospital.

Space arrangements are being made and within a short time the exhibition areas will be allotted to the New York dealers.

Some of the personal machinery of the former shows is retained and the campaign for big, successful shows is being pushed actively by Manager Charles A. Stewart and the show committee, which consists of: Chairman, Charles H. Larson, Cutting-Larson Co.; H. R. Bliss, Colt-Stratton Co.; Walter Woods, Van Cortland Vehicle Co.; William C. Poertner, Poertner Motor Car Co.; Harry J. DeBear, Maxwell Motor Sales Co.; R. J. Gilmore, Packard Motor Car Co.

Director of Bureau of Public Roads Dies Suddenly

CHICAGO, Dec. 10—Logan Waller Page, director of the Bureau of Public Roads, died suddenly of heart disease last evening. He had arrived to take part in the Highway Industries Association convention. Mr. Logan was a pioneer in highway work and the inventor of machines used in road improvement.

Electric Starter on All Ford Sedans

"Liberty" to Be Furnished Exclusively to Ford—Slight Increase in Price

NEW YORK, Dec. 7.—The new Ford sedans are to be equipped with an electric starter, and there will be a slight change in the price of the cars to cover the installation. The starter will be standard equipment for 1919 on as many cars as it is possible to obtain starters for. There are to be no mechanical changes in the Ford chassis except for some slight alterations made necessary to accommodate the starter.

Information regarding this radical departure from previous practice of the Ford Motor Co. comes to AUTOMOTIVE INDUSTRIES from an authentic source. Rumors to the effect that Ford contemplated a change of this character have been current many times during the past 2 years, and at one time it is known that a starter actually was developed and negotiations carried to the point where its equipment on all Ford models was practically assured. Later, however, difficulties arose which precluded the possibility of its addition.

Starters Supplied for Tanks

The starter which is to be used is one which has been developed and is now being produced by the Liberty Starter Co., which was organized originally to build starters for the Government, and obtained a contract for 16,500 of them. A number of these have been furnished for use on government tanks and other automotive equipment in the American Expeditionary Forces. Latterly the Government contract has been canceled, and it is understood that the Ford Motor Co. has contracted to absorb the entire output of the factory.

The Liberty Starter Co. occupies a factory of moderate dimensions, and its present output is approximately 500 starters a day. Another building of the same size is to be built immediately and the output more than doubled. The starter will be supplied exclusively to the Ford Motor Co.

Court Decides in Stewart Favor

CLEVELAND, Dec. 10—In a decision handed down Nov. 21, Judge Westenhaver of the United States District Court, held that the Jay Patent, No. 1,132,273, dated March 16, 1915, and on which the Stewart vacuum system is based, is infringed by the Sparton tank made by the Sparks-Withington Co., Jackson, Mich. Infringement is held on two out of fourteen or fifteen claims of the Stewart-Warner Co. On the other thirteen points it was held that the Sparton tank did not infringe. An injunction and accounting of damages and profits was granted Stewart-Warner against Sparks-Withington.

AUTOMOTIVE MATERIALS MARKETS

Materials Market Prices

Acids:
Muriatic, lb. ..... .02 -.03
Phosphoric (85%).. .35 -.39
Sulphuric (60), lb.. .006

Aluminum:
Ingot, lb. ..... .33
Sheets (18 gage or more), lb. ..... .42

Antimony, lb. ..... .13¾-.13⅞

Burlap:
8 oz., yd..... .17¼-.17½
10½ oz., yd..... .21½-.22

Copper:
Elec., lb. ..... .26
Lake, lb. ..... .26

Fabric, Tire (17¼ oz.):
Sea Is., combed, lb.1.65-1.70
Egypt, combed, lb.1.25-1.35
Egypt, carded, lb.1.20-1.30
Peelers, combed, lb.1.05-1.20
Peelers, carded, lb. .95-1.05

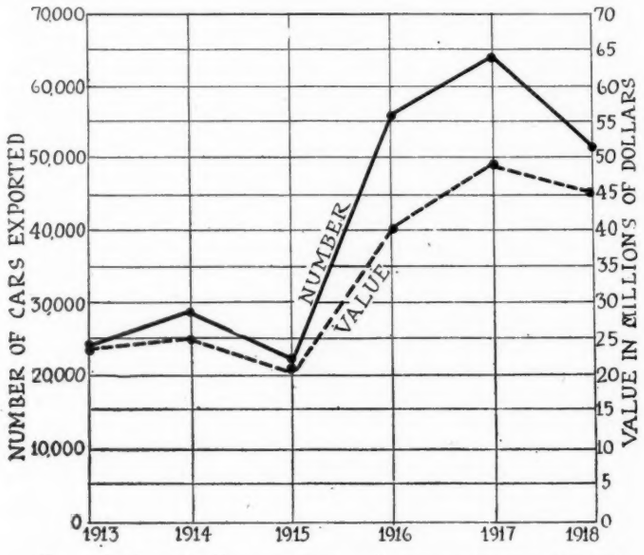
Fibre (⅛ in. sheet base), lb. ..... .50

Graphite:
Ceylon, lb. ..... .09 -.22
Madagascar, lb. ... .10 -.15
Mexico, lb. ..... .03¾

Lead, lb. ..... .06¾-.07¼

Leather:
Hides, lb. ..... .18 -.35¼

Nickel, lb. ..... .40



From 1915 to 1917 our exports of passenger cars showed a steady and satisfactory advance. This year's drop was caused by shortage of ocean transport and lack of fuel in many countries

Oil:
Gasoline:
Auto., gal. ..... .24½
68 to 70 gal..... .30½
Lard:
Prime City, gal..2 30-2.35
Ex. No. 1, gal...1.62
Linseed, gal. 1.63-1.65
Menhaden (Brown) gal. 1.35-1.36
Petroleum (crude),
Kansas, bbl. 2.25
Pennsylv'a, bbl. 4.00

Rubber:
Ceylon:
First latex pale crepe, lb. ..... .62½
Brown, crepe, thin, clear, lb. ..... .60
Smoked, ribbed sheets, lb. .... .61½
Para:
Up River, fine, lb. .62¼
Up River, coarse, lb. ..... .36
Island, fine, lb... .59

Shellac (orange), lb.. .74 -.75

Spelter ..... .08½-.08¾

Steel:
Angle beams and channels, lb. .... .03
Automobile sheet (see sp. table).
Cold rolled, lb..... .06½
Hot rolled, lb..... .03½

Tin ..... .71 -.72

Tungsten, lb. 2.20-2.50

Waste (cotton), lb... .12¾-.17

AUTOMOBILE SHEET PRICES

(Based on No. 22 Gage. Other gages at usual differentials)

	Primes only per 100 lbs.	Primes when seconds up to 15 per cent are taken per 100 lbs.
Automobile body stock.....	$5.95	$5.85
Automobile body stock, deep stamping	6.20	6.10
Automobile body stock, extra deep stamping	6.45	6.35
Hood, flat, fender, door and apron, or splash guard stock.....	6.05	5.95
Crown fender, cowl and radiator casing, extra deep stamping.....	6.55	6.45
Crown fender, cowl and radiator casing, deep stamping.....	6.30	6.20

Automobile Sheet Extras for Extreme Widths:
Nos. 17 and 18 over 36 in. to 44 in., 10c. per 100 lb.
Nos. 19 and 21 over 36 in. to 44 in., 30c. per 100 lb.
Nos. 22 to 24 over 26 in. to 40 in., 40c. per 100 lb.
Nos. 22 to 24 over 40 in. to 44 in., 80c. per 100 lb.

Black Sheet Extras to Apply to Narrow Widths:
Oiling, 10c. per 100 lb.
Patent leveling, 25c. per 100 lb.
Resquaring, 5 per cent of gage price after quality, finish and size extras have been added.

Seconds 10 per cent less than the invoice Pittsburgh price for corresponding primes.

Automobile Securities on the Chicago Exchange at Close Dec. 4

	Bid	Asked	Net Ch'ge
Auto Body Co.....	7	10	..
Briscoe Motor Car, com....	11	..	..
Briscoe Motor Car, pfd.....	40	55	..
Chandler Motor Car.....104		106	+4⅜
Chevrolet Motor Car.....144		146	..
Cole Motor Car Co.....	90	105	..
Continental Motors, com....	8½	9	..
Continental Motors, pfd.....	92	96	..
Edmunds & Jones, com....	18	..	..
Edmunds & Jones, pfd.....	75	90	..
Electric Storage Battery....	50	60	..
Federal Motor Truck.....	31	35	—2
Fisher Body Co., com.....	36	40	..
Fisher Body Co., pfd.....	92½	93	..
Ford Motor of Canada.....215		225	..
General Motors, com.....126½		127½	+1
General Motors, pfd.....	80¼	81¼	—1⅜
Hupp Motor Car, com.....	4½	5	..
Hupp Motor Car, pfd.....	81	85	..
Kelsey Wheel Co., com.....	28	33	..
Kelsey Wheel Co., pfd.....	85	90	..
Mahattan Electric S., com..	..	48	..
Maxwell Motor, com.....	28½	29½	+1½
Maxwell Motor, 1st pfd.....	51½	52½	+ ⅞
Maxwell Motor, 2nd pfd.....	20¾	21¾	+1½
McCord Mfg., com.....	30	35	..
McCord Mfg., pfd.....	90	95	..
Mitchell Motor Co.....	30	35	..

	Bid	Asked	Net Ch'ge
Motor Products Corp.....	40	..	+2
Nash Motors Co., com.....150		175	..
Nash Motors Co., pfd.....	85	95	..
National Motor Co.....	9	12½	..
Packard Motor Car, com....115		125	..
Packard Motor Car, pfd....	95	..	+3
Paige-Detroit Motor, com...	27	28	+ ½
Paige-Detroit Motor, pfd....	8¾	9¾	..
Peerless Motor Truck.....	14	17	—1
Pierce-Arrow Mot. C., com.	43½	44½	+2¼
Pierce-Arrow Mot. C., pfd..102⅛		103½	..
Premier Motor Corp., com..	4	..	..
Premier Motor Corp., pfd...	..	75	..
Prudden Wheel Co.....	15	17½	..
Reo Motor Car Co.....	22½	24	+1½
Republic Motor Truck, com.	33	37	—2
Republic Motor Truck, pfd.	88	92	..
Saxon Motor Car, com.....	7¾	9¾	+ ¼
Scripps-Booth Corp.....	21	25	..
Stewart Warner Speed. Corp.	75	77	+1
Stromberg Carburetor Co...	24	28	..
Studebaker Corp., com.....	52⅝	53⅝	+3⅝
Studebaker Corp., pfd.....	92¼	100	..
Stutz Motor Car Co.....	46¼	48¼	+2¼
United Motors Corp.....	32⅝	34⅜	+ ⅝
White Motor Co.....	46½	47½	+2
Willys-Overland, com.....	25½	26½	+1¾
Willys-Overland, pfd.....	87	89	..

Rubber Stocks

	Bid	Asked	Net Ch'ge
Ajax Rubber Co.....	61	63	..
Firestone T. & R., com.....125		132	..
Firestone T. & R., pfd.....	99	101	..
Fisk Rubber Co., com.....	60	65	..
Fisk Rubber, 1st pfd.....	97	103	..
Fisk Rubber, 2nd pfd.....	79	83	..
Fisk Rubber, 1st pfd. conv..	90	97	..
Goodrich, B. F., com.....	52	53	..
Goodrich, B. F.,, pfd.....101		103	—1
Goodyear T. & R., com.....225		235	..
Goodyear T. & R., 1st pfd...102		103	..
Goodyear T. & R., 2nd pfd..101		102	..
Kelly-Springfield, com.....	56	58	..
Kelly-Springfield, pfd.....	88	92	..
Lee Tire & Rubber Co.....	20	21	..
Marathon Tire & Rubber... ..		55	..
Miller Rubber Co., com.....142		148	..
Miller Rubber Co., pfd.....	96	98	..
Rubber Products Co..... ..		101	..
Portage Rubber Co., com...145		149	..
Swinehart T. & R. Co.....	50	60	..
U. S. Rubber Co., com.....	62	64	..
*U. S. Rubber Co., pfd.....104½		105½	..

*Ex Dividend.

Accomplishments of the Aircraft Production Board

John D. Ryan's Report Shows That Though There May Have Been Some Inefficiency Quantity Production Was Being Rapidly Approached

WASHINGTON, Dec. 9—When in May, 1918, the Senate was denouncing the Air Service because of "defects in the Liberty engine," "insufficient production," etc., there had been delivered 1104 Liberty engines, 1794 foreign combat engines and 6377 training engines, according to the annual report of John D. Ryan (May 24 to June 30, 1918) made public here to-day.

Up to May 24 148 battleplanes and 5091 training planes had been produced. The report shows clearly that the Air Service, although in some degree possibly inefficient, was undoubtedly entering into quantity production and headed for the production scale provided by the program. Instruments, accessories, machine guns, bombs, photographic equipment and balloons were all in a production that was growing steadily.

The Bureau of Aircraft Production was divided, states the report, into seven divisions—executive, engineering, production, spruce production, procurement, finance, advisory and consulting. A special mission of French and Italian engineers had been brought to this country and was engaged in the development of experimental plans. Spruce production totaled over 56,000,000 ft. up to May 24, while fir shipped up to that date amounted to 19,216,000 ft.

Total appropriations made by Congress for aviation amounted to $682,646,067.16. Orders for airplanes and spare parts, balloons, plans, general equipment, instruments and engines totaled $570,437,818.52 to June 30, 1918. Construction of buildings, flying fields, and training and operation and maintenance to June 30 totaled $181,312,821.72, making a total of obligations incurred of $751,750,640.24.

Cash disbursements to June 30, 1918, for airplanes and parts, engines and parts, balloons, general equipments, plants and experiments totaled $208,419,894.53, and for building and flying field construction, training, operation and maintenance there was expended $164,898,494.11, making a total of cash disbursements up to June 30, 1918, of $370,318,388.64.

At that time, when Congressmen and others were denouncing the "wasteful" disposal of the $640,000,000 appropriated for aviation, in the latter part of May—there had actually been expended but $182,292,373.39 for airplanes, spare parts, engines and spare parts, balloons and accessories, general equipment, plants and experiments, and at that same time there had been delivered more than 9200 Liberty, foreign combat and training engines, over 6000 training and battle planes, 14,000 propellers, millions of feet of mahogany, walnut, spruce and other necessary woods, 34,000 machine guns and many thousands of other accessories of vital importance to the aircraft program.

Following is the complete report of the Bureau of Aircraft Production from May 24 to June 30, 1918, after the appointment of John D. Ryan to head the Bureau until the end of the fiscal year:

Complete Text of the Report of the Bureau of Aircraft Production

JOHN D. RYAN, DIRECTOR.

(*May* 24 *to June* 30, 1918)

1—Creation of the Bureau of Aircraft Production

Under date of May 20, 1918, by Executive order of the President and by General Order No. 51 of the War Department, the Bureau of Aircraft Production was established.

The bureau was described as "an executive agency" which "shall exercise full, complete and exclusive jurisdiction and control over the production of airplanes, airplane engines, and aircraft equipment for the use of the Army."

The order provides that such person as shall at the time be chairman of the Aircraft Board shall also be the executive officer of the Bureau of Aircraft Production. He is designated as "Director of Aircraft Production," and the order provides that he shall, under the direction of the Secretary of War, have charge of the activities, personnel and properties of said bureau.

2—Aircraft Board

From the date of the creation of the Aircraft Board by act of Congress approved Oct. 1, 1917, to May 24, 1918, the Aircraft Board acted in an advisory capacity to the Secretary of the Navy and to the Chief Signal Officer of the Army, with respect to the purchase, production, and manufacture of aircraft, and made recommendations as to contracts and their distribution in connection with the foregoing.

The Navy has continued to function in its relations to the Aircraft Board in substantially the same manner as heretofore.

The board acts as a clearing house for information regarding aviation as between the Army and the Navy. The Executive order of May 20, 1918, which gave to the Bureau of Aircraft Production the jurisdiction and control of the production of airplanes for the Army, recognizes the existence of the Aircraft Board in designating the chairman of that board as head of the Bureau of Aircraft Production, and neither enlarges nor diminishes the duties and functions of the board.

The Aircraft Board consists of the following:

Civilian Members—John D. Ryan, chairman; R. F. Howe, vice-chairman, and W. C. Potter.

Army Members—Maj. Gen. W. L. Kenly, Col. E. A. Deeds and Col. R. L. Montgomery (last two temporarily relieved).

Navy Members—Rear Admiral D. W. Taylor, Capt. N. E. Irwin and Lieut. Commander A. K. Atkins.

3—Organization of the Bureau of Aircraft Production

In order to carry out the program and provide the equipment, the bureau is divided into seven main divisions:

(a) Executive.
(b) Engineering.

(c) Production.
(d) Spruce Production.
(e) Procurement.
(f) Finance.
(g) Advisory and Consulting.

The Executive Division directs the activities of the bureau.

The Engineering Division is responsible for the design of new models of airplanes and engines and all accessory equipment, necessary to meet the military requirements, and when developed to furnish models and drawings to the production department for the producing of quantities called for by the program.

The Production Division is charged with responsibility for the supervision of the production and inspection of all aircraft, including materials and parts therefor, for the investigation and selection of sources of supply, and for the conduct of all relations with contractors, with the exception of the production engineering, the execution of contracts, and matters of financial administration.

The activities of the Production Division are carried on by decentralization through district offices, which are established in various sections of the country where concentrated aircraft production is being carried on. By this means direct contact with the manufacturers is obtained and decisions can be rendered with the least possible delay.

It is of interest to note that aircraft requirements emanate from the Director of Aircraft Production for complete planes, engines and accessories, and are set forth in an authorized program furnished by the Office of the Secretary of War, which states that certain types of airplanes and airplane engines in certain monthly quotas of each type are required, these types having previously been determined largely by the Air Forces overseas.

In connection with production, it is of interest to note what has been accomplished:

Airplane Engine Production

	Total shipments to May 24.	Shipments May 24 to June 30, inclusive.	Total to June 30, inclusive.
Liberty engines:			
Army type	622	994	1,616
Navy type	482	293	775
Total	1,104	1,287	2,391
Foreign combat engines:			
Gnome	179	30	209
Hispano-Suiza 150-hp.	1,607	581	2,188
Hispano-Suiza 180-hp.	..	6	6
Hispano-Suiza 300-hp.	2	..	2
LeRhone 80-hp.	6	62	68
Total	1,794	679	2,473
Training type:			
Curtiss OX5	4,258	1,216	5,474
Hall-Scott A7a	2,053	130	2,183
Lawrence	66	48	114
Total	6,377	1,394	7,771
Grand total engines	9,275	3,360	12,635

The foregoing figures show shipments from the factory.

In addition to this production, a certain percentage of spares have been included in the shipment of each type of engines.

Combat engines, consisting of the Hispano-Suiza 180-horsepower and the Liberty 12 are in large quantity production, while the Hispano-Suiza 300-horsepower and the Liberty 8 are approaching actual production, and the output of each plant is being pushed to the utmost limit, as it is realized that this country is called upon to supply a large percentage of the requirements of the allies in addition to equipping planes which are produced in this country. Sufficiently extensive tests of these engines have been made to warrant a feeling of assurance that they will be satisfactory in service.

Battleplane Production

Total battleplanes produced to May 24, 1918	148
Total battleplanes produced May 24 to June 30, 1918	393

Training Planes

Total training planes produced to May 24, 1918	5,091
Total training planes produced May 24 to June 30, 1918	523

In addition to this shipment of planes there is a percentage of approximately 80 per cent parts shipped as spares for battleplanes and approximately 100 per cent as spares for training planes.

In order to show in further brief detail what has been accomplished in developing the manufacturing resources of this country in quantity production, a list is given herewith showing in part orders now placed and quantities shipped first up to May 25, second up to June 29, 1918.

Articles or material	Quantity Ordered up to — May 25	Quantity Ordered up to — June 29	Quantity Freighted up to — May 25	Quantity Freighted up to — June 29
Service planes:				
Observation and day bombing—				
DeH-4	8,000	8,000	155	529
Bristol fighter	2,000	2,000	11	24
Night bombing—				
Handley-Page	[1] 500	[1] 500	.....	.....
Caproni	500	1,000	.....	.....
Monoplane pursuit				
SE-5 (Auth)	1,000	1,000	.....	.....
Service engines:				
U. S.-12 Army type	20,000	20,000	628	1,615
U. S.-12 Navy type	2,500	2,500	482	775
Bugatti	2,000	2,000	.....	.....
Hispano 180-hp. (Auth)	3,000	[2] 3,000	.....	.....
Hispano 300-hp.	3,000	3,000	2	2
Elementary training planes:				
Jn-4-D	3 700	3,975	2,837	2,972
SJ-1	1,600	1,600	1,600	1,600
Advanced training planes:				
JN4-H training	402	402	402	402
JN4-HG and JN6-HG-2	427	517	83	321
JN4-HB and JN6-HB	250	254	16	100
JN6-H observation	100	100	.....	.....
JN6-H pursuit	125	125	.....	.....
S-4-B	100	100	100	100
S-4-C	400	400	30	73
Penguin	300	300	36	50
VE-7 (Auth)	1,600	1,600	.....	.....
Engines:				
Elementary training engines				
OX-5	7,950	7,950	4,340	5,474
A7a	2,250	2,250	2,054	2,178
Hispano 150-hp.	3,500	3,500	1,685	2,188
Gnome 100-hp.	242	242	[3] 177	[3] 209
LeRhone 80-hp.	2,500	2 500	7	68
Lawrence 28-hp.	450	450	65	114
Raw materials:				
Mahogany (1,000 ft.)	26,409	26,728	2,219	3,257
Walnut (1,000 ft.)	3,354	5,093	853	1,123
Spruce (1,000 ft.)	107,204	107,204	[4] 17,355	[4] 26,260
Oak (1,000 ft)	281	281	261	281
Birch (1,000 ft.)	632	632	561	633
Cherry (1,000 ft.)	.....	676	.....	338
Fir (1,000 ft.)	50,234	50,234	[4] 5,926	[4] 8,346
Linen (1,000 yds.)	3,187	3 187	2,548	2,863
Cotton (1,000 yds.)	15,934	17,476	1,876	2,948
Cotton tape (1,000 yds.)	4,256	6,566	2,096	2,359
Acetate dope (1,000 gallons)	204	410	108	234
Propellers (spares):				
Training	30,988	31,312	14,761	19,948
Combat	4,925	6,925	176	1,373
Instruments and accessories:[6]				
Air pressure gauges	10,000	10,000	4,889	6,273
Air speed indicators	13,500	13,500	1,789	2,115
Altimeters	33,600	43 600	7,996	10,108
Clocks	15,500	20,500	8,484	10,900
Compasses	12,200	12,200	2,145	4,228
Fire extinguishers	11,100	11,100	6,105	7,827
Gunners' safety belts	5,000	5 000	.....	309
Map cases	2,500	2,500	.....	4
Navigation lights (sets of 3)	.....	5,000	.....	150
Navigation lenses	6,500	6,605	.....	1,825
Oil pressure gauges	10,000	10 000	4,965	8,103
Oxygen apparatus	6,000	6,000	88	641
Oxygen helmets	10,000	10,020	.....	16
Oxygen tanks	10,000	10 000	44	9,409
Panels (sets of 2)	.....	7,500	.....	.....
Radiator thermometers	12,500	12,500	6,489	7,831
Standard safety belts	4,025	9 525	3,777	4,688
Tachometers	25,000	25,000	10,191	12,433
Voltage regulators	.....	2,500	.....	.....
300-watt generators	.....	2,500	.....	.....
Machine guns:				
Lewis	39,200	39,200	6,081	10,370
Vickers (ground)	12,000	12 000	7,005	8,245
Vickers (aircraft)	[1]	[1]	8	56
Marlin	38,000	38,000	20,744	22,353
Browning	20,000	20,000	.....	.....
Ordnance accessories:				
Synchronizing devices—				
C. C. interrupter gears	1,250	4,750	604	1,229
C. C. generator	2,500	2 500	.....	.....
Mechanical interrupter gears	635	635	135	160
Gun mounts:				
Single flexible ring	10,000	15,000	6,530	8,435
Gun sights:				
Ring	13,200	13,200	4,523	7,050
Wind vane	10,499	12,999	4,326	6,849
Unit	8,000	8,000	628	1,323
Auxiliary	11,000	11,000	.....	.....
Gun yokes:				
Single Lewis	11,000	11,000	.....	.....
Double Lewis	11,000	11,000	.....	.....
Duplex trigger control	11,000	11,000	.....	.....
Single gun stems	9,202	9,202	4 004	4,653
Unit sight brackets	11,000	11,000	.....	.....
Bombs:				
Incendiary—				
Mark I	112,116	112,116	1	207
Mark II	122,886	122,886	2	8
High capacity drop—				
Mark I	132,000	132,000	.....	70
Mark II	70 000	70,000	102	299
Mark III	220,000	220,000	.....	432
Mark IV	73.733	73,733	.....	.....
Mark V	20.988	20,988	.....	.....
Barlow, heavy	28,000	28,000	12	12
Dummy drop, Mark I	85,000	85,000	8,662	10,008

[1] Program is for 1,000.
[2] 1,000 ordered, 2,000 additional authorized but not ordered.
[3] Includes 46 from the Navy.
[4] Balloon and airplane fabric.
[5] These figures taken from inspection returns.
[6] Does not include quantities shipped to allies.

Articles or material	Quantity ordered up to— May 25	Quantity ordered up to— June 29	Quantity freighted up to— May 25	Quantity freighted up to— June 29
Bomb accessories:				
Bomb sights—				
Low altitude, Mark I	100	100	100	100
High altitude, Mark I-a	15,000	15,000	135	549
Bomb releases—				
Mark I	(2)	(2)	(2)	(2)
Mark II	(2)	(2)	(2)	(2)
Mark V	2,420	2,420	1,051	1,051
Mark VIIB (traps only)	100	100	.....	100
Barlow, heavy	250	250	19	182
Flares—				
Wing tip	(2)	112,165	.....	.....
Airplane, Mark I	(2)	50,083	.....	.....
Flare brackets, holders—				
Wing tip	22,000	22,000	.....	.....
Airplane, Mark I	(2)	(2)	.....	.....
Very pistols	22,500	22,500	.....	.....
Photographic equipment:				
Observation cameras	965	965	491	665
Enlarging lanterns	463	463	463	463
Camera guns	709	1,409	347	358
Unit section equipment	97	97	97	97
Cradles	.....	909	.....	175
Hangars:				
Steel, 66 by 100	735	735	36	258
Steel, 66 by 140	234	234	202	234
Steel, 100 by 110	315	315	.....	90
Canvas	2,500	2,500	1,736	2,160
Balloons:				
Kite, type "R"	1,077	1,102	124	180
Balloon essentials				
Ferrosilicon (tons)	1,320	1,320	810	954
Caustic soda (tons)	942	942	661	713
Hydrogen cylinders	107 800	107,800	63,350	66,000
Cable (feet)	1,120,200	1,143,390	1,007,292	1,119,492
Winches	53	55	21	23
Balloon equipment (units)	87	87	87	87
Balloon equipment	8	8	8	8
Special clothing:				
Pilots and observers—				
Goggles, Nos. 1, 2, and 3	20,669	20,669	16,349	19,349
Soft helmets and caps	13,976	13,976	13,976	13,976
Hood, French type	13,000	13,000	3,003	9,003
Chin guards, No. 4	7,476	7,476	7,476	7,476
Sweaters, No. 5	10,576	10,576	8,364	9,894
Winter flying suits	13,012	13,012	8,375	10,255
Summer flying suits	1,000	1,000	1,000	1,000
Moccasins, No. 8	16,500	16,500	9,757	14,981
Gauntlets, No. 9	4,603	4,603	1,600	4,588
Gauntlets, No. 10	4,603	4,612	2,200	4,612
Aviator coats	12,327	12,255	12,255	12,255
Face masks	3,003	3,003	3,003	3,003
Antisinking aviator coats	.....	825	.....	771
Knitted scarfs	12,000	13,000	2,000	6,000
Hard helmets	6,600	6,600	4,500	6,600
Chauffeurs and motorcyclists—				
Goggles, No. 21	16,286	16,286	16,286	16,286
Soft helmets and caps	19,334	19,334	19,334	19,334
Trousers, No. 29	19,286	19,286	19,286	19,286
Gauntlets	50,000	50,000	50,000	50,000
Coats, No. 28	19,286	19,286	16,286	19,286
Flying students—				
Goggles, Nos. 1 and 2	8,195	8,195	5,593	8,195
Hard helmets, Nos. 17 and 18	6,540	6,540	4,040	6,540
Sweaters, No. 5	5,700	5,700	1,500	2,700
Summer flying suits	4,440	6,440	2,199	4,088
Aviator coats	4,743	4,743	4,743	4,743
Construction squadrons:				
Boots, knee	5,025	5,025	3,750	5,025
Boots, hip	5,525	5,525	4,250	5,525
Coats, oil skin	6,750	6,750	6,750	6,750
Trousers	6,750	6,750	6,750	6,750
Hats	6,750	6,750	6,750	6,750
Balloon companies—				
Soft helmets	1,152	1,152	1,152	1,152
Sweaters	1,152	1,152	1,152	1,152
Winter flying suits	1,376	1,376	224	224
Moccasins	1,376	1,376	224	1,376
Face masks	1,152	1,152	1,152	1,152
Leather coats	1,376	1,376	224	1,376
Knitted scarfs	1,152	1,152	1,152	1,152
Leather vests	1,152	1,152	.....	.....
Leather breeches	1,152	1,152	.....	.....
Miscellaneous orders—				
Mechanician suits	85,700	85,700	80,103	85,700

Some idea may be gained from this list of the task of developing and getting into production the various products required by the Air Service, most of them never before having been produced in this country and representing a new art, to develop which both engineers and skilled workmen have to be trained and made proficient.

The manufacturers selected are entitled to the greatest credit for the co-operation and activity they have shown in turning over their existing facilities, and in many cases adding to these facilities in order to meet the requirements.

Recognition is also given to the hearty assistance accorded this bureau by other Government departments.

Special Allied Missions

A special French Engineering Mission and a special Italian Engineering Mission have been brought to this country and are now engaged in the development of experimental planes of various types, which will be carefully tested and put into immediate production if satisfactory to the Air Service. The manufacturing facilities of this country are being rapidly developed for the production of complete battle planes in quantity, and also for the production of finished parts, which will be sent overseas for assembly.

[1] Included in above. [2] No orders placed.

4—Spruce Production Division

The output of spruce on the Western Coast is being rapidly increased, and in order to give an intelligent picture of the methods in bringing about these results, the following figures on output are of particular interest:

Spruce	Feet
Total spruce shipped up to May 24, 1918	56,711,044
Total spruce shipped May 24 to June 30	8,413,542
Grand total spruce shipped	65,124,586
Fir	
Total fir shipped to May 24, 1918	19,216,012
Total fir shipped May 24 to June 30	6,181,737
Grand total fir shipped	25,397,749

Of the total shipments of spruce 2,530,824 feet were shipped direct to England from the southern district.

Of the total fir shipped, 7,055 feet consisted of wing beams completely finished.

Spruce Production Personnel

	On May 24	On June 30
Commissioned personnel	459	538
Enlisted personnel	12,382	17,697
Civilian personnel	71	70
Total	12,912	18,305

Spruce Production Cut-up Plant

In addition to the activities of the spruce production division in getting spruce through regular lumber camp channels, a cut-up plant has been located on a Government reservation at Vancouver, Wash. Work on this cut-up plant was begun December 24, 1917, and completed February 7, 1918.

The inception of the idea of a cut-up plant to supplement the sawmills was due chiefly to the necessity of manufacturing rived cants by those not having sawmills. The cut-up plant is now being used for the manufacture of airplane lumber from the entire log.

Machinery of the most modern type has been secured and scientific methods of manufacturing aircraft material adopted. Circular head saws are being used in four of the six units of the mill, and band saws in the other two.

The logs and rived cants are shipped to the plant and are handled by the band saws, and the other units take the flitches from the sawmills in the woods. It is estimated that the cut at the mill can be run up to 9,000,000 feet per month.

In this plant the logs are cut to dimensions, which does away with the waste incident to transporting lumber across the country.

Dry Kiln

A dry-kiln plant of the Tidman pattern has been erected adjacent to the cut-up plant. The tremendous amount of material lost through checking in transportation and improper kiln-drying methods has been done away with by the installation of this plant. It is estimated that the saving in freight will pay for the erection of this plant within 12 months.

The plant consists of 24 modern kilns, each having a charge capacity of about 30,000 feet. The time of drying depends upon the size and condition of the wood, averaging from 12 to 30 days. The output of the dry-kiln plant averages 40,000 feet daily.

5—Finances

Total appropriations, obligations, and disbursements as of May 31, and June 30, 1918, for all aviation purposes and not confined to production:

Appropriations

Increase for aviation, Signal Corps, 1918	$640,000,000.00
Signal Service of the Army, 1917-18, aeronautics act June 15, 1917	31,846,067.16
Signal Service of the Army, 1918, aeronautics act May 12, 1917	10,800,000.00
Total	$682,646,067.16

Obligations	To May 31, 1918	June 1 to June 30, 1918	Total to June 30, 1918
Airplanes and spare parts	$195,193,636.18	$22,401,604.97	$217,595,241.15
Engines and spare parts	249,188,596.81	4,967,050.40	254,155,647.21
Balloons and accessories	11,071,431.52	274,249.28	11,345,680.80
General equipment	79,048,280.52	2,458,740.82	81,507,021.34
Acquisition of plants	2,595,599.83	.....	2,595,599.83
Experimental and research	2,973,817.20	264,810.99	3,238,628.19
Total	$540,071,362.06	$30,366,456.46	$570,437,818.52

Obligations—Continued	To May 31, 1918	June 1 to June 30, 1918	Total to June 30, 1918
Construction of buildings and flying fields, including purchase and lease of land, United States and abroad	$68,956,838.35	$2,961,061.64	$71,917,899.99
Training, operation, and maintenance	92,358,991.33	17,035,930.40	109,394,921.73
Total	$161,315,829.68	$19,996,992.04	$181,312,821.72
Grand total	701,387,191.74	50,363,448.50	751,750,640.24
Cash Disbursements			
Airplanes and spare parts	$76,257,253.08	$7,464,198.94	$83,721,452.02
Engines and spare parts	69,520,425.62	8,169,015.43	77,689,441.05
Balloon and accessories	1,718,082.71	422,397.47	2,140,480.18
General equipment	35,498,567.20	6,718,528.52	42,217,095.72
Acquisition of plants	1,036,952.54	.....	1,036,952.54
Experimental and research	1,261,094.24	353,378.78	1,614,473.02
Total	$185,292,375.39	$23,127,519.14	$208,419,894.53
Construction of buildings and flying fields, including purchase and lease of land, United States and abroad	$57,642,578.62	$4,666,352.26	$62,308,930.88
Training, operation, and maintenance	82,335,163.18	20,254,400.05	102,589,563.23
Total	$139,977,741.80	$24,920,752.31	$164,898,494.11
Grand total	$325,270,117.19	$48,048,271.45	$373,318,388.64

It is of particular interest to note that there has been disbursed in cash up to June 30 a total of $208,419,894, covered by Air Service material, and a total of $164,898,494 for buildings, flying fields, training, and maintenance. Of this amount there have been cash disbursements of approximately $1,000,000 for experimental work on engines and planes at the McCook Experimental Field, Dayton, Ohio, and a cash disbursement of approximately $350,000 up to June 30 for special gas at the Fort Worth, Tex., Experimental Plant. In addition to this, there has been a total expenditure of approximately $200,000 in completing the development of the present battle planes so as to take advantage of American manufacturing methods and quantity production.

6—Personnel

One of the most difficult problems which continually faces the director of this bureau is the securing of the proper personnel to carry on the activities of this very specialized industry, about which so little was known in this country at the time war was declared. With the other activities of the Government, the problem grows more serious each day.

In order to convey an idea of what this problem is, a detailed set of statistics is given showing the enlisted, commissioned and civilian personnel—first, in Washington, and, second, in the district offices or plants where aircraft is being produced.

Personnel in Washington (excluding Spruce Production Division)

Rank or status	May 24, 1918 Men	May 24, 1918 Women	June 30, 1918 Men	June 30, 1918 Women
Commissioned				
Colonels	1	....	2	....
Lieutenant colonels	4	....	5	....
Majors	16	....	18	....
Captains	66	....	73	....
First lieutenants	111	....	101	....
Second lieutenants	116	....	120	....
Total commissioned	314	....	319	....
Civilian				
Executives	21	....	24	....
Volunteers	9	....	8	....
Production experts	238	....	187	62
A. M. engineers	74	....	76	....
Inspectors, A. and A. E.	97	....	86	....
Expert cost accountants	14	....	18	....
Stenographers	82	248	51	300
Typists	45	135	48	141
Clerks	133	270	144	290
Catalogue and index clerks	....	55	....	62
Laborers	30	....	31	....
Messengers	117	59	150	23
Watchmen	61	....	56	....
Charwomen	....	68	....	69
Telephone operators	....	19	....	20
Elevator operators	6	....	6	....
Miscellaneous	107	7	140	7
Total civilians	1,034	861	1,025	974
Combined totals	1,895		1,999	
Grand total	2,209		2,318	

Note.—No master signal electricians, sergeants, corporals, or privates were assigned.

Personnel outside of Washington (excluding Spruce Production Division)

Rank or status	May 24, 1918	June 29 1918
Commissioned		
Colonels	1	1
Lieutenant colonels	4	1
Majors	11	6
Captains	65	29
First lieutenants	149	127
Second lieutenants	125	130
Total commissioned	355	294
Civilian		
Executives	1	....
Volunteers	....	....
Production experts	124	128
A. M. engineers	97	154
Inspectors, A. and A. E.	2,260	2,367
Expert cost accountants	57	84
Stenographers	114	130
Typists	4	6
Clerks	133	133
Catalogue and index clerks	....	....
Laborers	1	2
Messengers	35	34
Watchmen	1	....
Charwomen	....	....
Telephone operators	7	8
Elevator operators	....	....
Miscellaneous	78	130
Total civilians	2,912	3,176
Grand total	3,267	3,470

Note.—Prior to Aug. 1, 1918, all enlisted men were of the Division of Military Aeronautics detailed for special duty in the bureau. They comprised master signal electricians; sergeants, first class; sergeants; Chauffeurs, first class; Chauffeurs; corporals; cooks; privates, first class; privates.

Report of Personnel Department, Bureau of Aircraft Production, Washington (excluding Spruce Production Division), as of June 30, 1918.

Rank or status	Executive	Engineering	Production	Procurement	Finance	Advisory	Spruce	Total
Commissioned								
Colonels	2	..	..	..	..	..	..	2
Lieutenant colonels	2	1	1	..	1	..	..	5
Majors	1	1	11	2	2	1	..	18
Captains	9	5	36	11	10	1	1	73
First lieutenants	17	5	44	14	21	..	..	101
Second lieutenants	17	9	46	21	27	..	..	120
Total commissioned	48	21	138	48	61	2	1	319
Civilian								
Executives	3	4	5	9	2	1	..	24
Volunteers	2	..	1	4	..	1	..	8
Production experts	35	45	66	53	48	2	..	249
A. M. engineers	..	50	23	3	..	..	..	76
Inspectors, A. and A. E.	2	10	74	..	..	..	..	86
Expert cost accountants	..	..	1	2	15	..	..	18
Stenographers	78	10	98	116	47	2	..	351
Typists	52	4	44	49	40	..	..	189
Clerks	75	18	101	98	142	..	..	434
Catalogue and index clerks	21	1	19	13	8	..	..	62
Laborers	29	2	..	..	..	..	..	31
Messengers	75	10	31	43	13	1	..	173
Watchmen	56	..	..	..	..	..	..	56
Charwomen	68	1	..	..	..	..	..	69
Telephone operators	20	..	..	..	..	..	..	20
Elevator operators	6	..	..	..	..	..	..	6
Miscellaneous	60	24	26	10	27	..	..	147
Total civilians	582	179	489	400	342	7	..	1,999
Grand total	630	200	627	448	403	9	1	2,318

Note.—No enlisted men assigned.

These figures show an increase in personnel from May 24 to June 30 of approximately 24 per cent.

7—Special Missions

In order to carry out a thorough study of European production of airplanes, engines and accessories, a special mission was sent overseas in June, 1918. This mission consisted of experienced experts from the United States on engines, planes, electrical equipment, contracts, instruments and accessory apparatus.

The necessity for continued liaison service between France and this country increases daily, but with the rapid training of the men responsible for the direction of the various departments this situation should be materially improved.

An invitation on the part of the allies has been given to the manufacturing plants of the United States to send their officers and plant managers to Europe to study European methods and adopt from their practice what will be of advantage to supplement American methods.—W. C. POTTER, *Acting Director of Aircraft Production.*

3 Years' Exports to Latin America

Despite Shortage of Ocean Transport Our Trade With Republics Has Increased Satisfactorily

NEW YORK, Dec. 10—Trading with the Latin American Republics has been conducted under many difficulties during the past three years, more especially during the periods when every available vessel was transferred to transatlantic service. Despite the shipping shortage and the many formalities surrounding export business in wartime plus the shortage of both material and labor, our exports of cars and trucks to Latin America have shown a steady increase.

Comparing 1918 figures with those of 1917, it is found that while the 1918 increase in number of passenger cars exported is but slightly in excess of 7.7 per cent, their value has increased no less than 37 per cent. This increase is partly due to higher prices, but it is also indicative of the Latin American demand for cars of more expensive types. As compared with 1916, the 1917 figures show an increase of 52 per cent in number and 76 per cent in value.

Truck exports, although not as great as they should be, also show gains.

Exports of Passenger Cars and Trucks from the United States to Latin American Countries for the Three Fiscal Years Ending June 30, 1916, 1917 and 1918

	Passenger Cars						Trucks					
	1916 No.	1916 Value	1917 No.	1917 Value	1918 No.	1918 Value	1916 No.	1916 Value	1917 No.	1917 Value	1918 No.	1918 Value
Argentina	4,399	$2,065,439	3,924	$2,336,001	3,525	$2,666,898	45	$33,063	141	$146,255	51	$50,124
Bolivia	26	16,208	141	100,151	152	105,408	....	.....	20	48,590	14	24,958
Brazil	272	157,968	873	523,383	1,575	1,000,011	11	19,635	14	8,300	24	31,133
Chile	826	530,211	2,587	1,821,842	3,399	3,576,511	17	46,566	69	160,696	220	282,638
Colombia	91	58,525	173	118,937	164	121,422	4	1,236	2	4,998	3	7,100
Costa Rica	60	28,325	37	23,125	199	85,070	....	.....	....	.....	5	10,245
Cuba	3,698	2,091,295	3,529	2,545,071	2,846	3,029,813	117	171,647	397	722,519	554	1,130,982
Dom. Republic	131	60,127	191	96,173	248	157,607	4	5,173	22	23,640	21	13,323
Ecuador	62	44,396	137	106,478	142	130,086	2	3,378	1	2,050	3	6,876
Guatemala	24	23,552	35	36,174	34	46,657	2	4,916	4	4,323	3	5,512
Haiti	10	3,788	29	13,780	102	54,613	....	.....	....	.....	11	10,578
Honduras	34	22,652	42	24,564	16	12,292	6	14,540	4	4,094	6	3,373
Mexico	383	309,200	2,807	1,642,011	2,578	1,653,545	51	100,500	218	198,151	365	525,664
Nicaragua	....	6,275	....	3,084	49	32,031	....	.....	....	.....	1	2,509
Panama	288	170,964	356	216,711	129	93,329	32	55,171	75	97,970	47	47,859
Paraguay	6	2,256	40	20,192	13	5,025	....	1,394	....	4,172	....	.....
Peru	59	40,388	400	295,558	784	913,669	5	5,830	25	48,776	73	155,834
Salvador	68	54,598	75	62,314	54	68,297	....	.....	....	.....	4	14,811
Uruguay	285	150,540	1,165	612,838	2,232	1,177,463	2	5,818	4	10,437	16	15,809
Venezuela	518	314,156	542	327,507	160	97,485	6	13,029	14	28,502	16	12,410
	11,180	$6,150,836	17,083	$10,925,894	18,401	$15,027,232	304	$486,896	1,010	$1,513,473	1,437	$2,351,738

Calendar

ENGINEERING

S. A. E. Meetings

1919

Jan. 8—Minneapolis Section, S. A. E.—Hotel Radisson. "Governors for Tractors and Truck Engines."

Jan. 12, 13, 14 — New York. Winter Meeting, Society of Automotive Engineers, Engineering Societies' Building.

Feb. 5—Minneapolis Section, S. A. E. — Hotel Radisson. "Radiator Cooling Fans."

March 5 — Minneapolis Section, S. A. E.—Hotel Radisson. "Tractor Service and Sales."

April 2—Minneapolis Section, S. A. E. — Hotel Radisson. "Implements Designed for Tractor Belt Power and Their Characteristics."

MOTOR SHOWS

Dec. 12-14—Dallas, Tex. Dallas Automobile Trades Assn.

January — Detroit, Mich. Detroit Automobile Dealers' Assn. H. H. Shuart, Manager.

January or February—Milwaukee, Wis. Milwaukee Auto Trade Assn. Bart J. Ruddle, Manager.

Jan. 24-30 — Milwaukee, Wis. Eleventh Annual, Milwaukee Automobile Dealers, Inc., Auditorium. Bart J. Ruddle, Manager.

February—Grand Rapids, Mich. Grand Rapids Automobile Business Assn. E. T. Conlon, Manager.

Feb. 15 - 22 — Louisville, Ky. Louisville Auto Dealers' Assn.

Feb. 15-22—Newark, N. J. N. J. Auto Exhibition Co. Calude Holgate, Manager.

Feb. 15-22—Minneapolis, Minn. Northwestern Automotive Exposition, Overland Building.

Feb. 15-22—Minneapolis, Minn. Minneapolis Auto Trade Assn. Walter B. Wilmot, Manager.

Feb. 17-22—Des Moines, Iowa. Tenth Annual, Des Moines Automobile Dealers' Assn. C. G. Van Vliet, Manager.

Feb. 17-24 — Passenger Cars; Feb. 24-27, Trucks—South Bethlehem, Pa. Lehigh Valley Auto Shows Co. J. L. Elliott, Manager.

March—Philadelphia, Pa. Philadelphia Automobile Trade Assn. Passenger cars.

March—Motor Truck Assn. Trucks.

Mar. 3-8—Columbus, O. Columbus Automobile Show Co., Memorial Building. W. W. Freeman, Manager.

March 3-8—Buffalo. N. Y. Buffalo Automobile Dealers' Assn.

March 1-10—San Francisco, Cal. Motor Car Dealers' Assn. G. A. Wahlgreen, Manager.

March—Boston. Boston Automobile Dealers' Assn. Chester I. Campbell, Manager.

Second or third week March—St. Louis, Mo. St. Louis Auto Mfrs. & Dealers' Assn. Robert E. Lee, Manager.

March 22-29, Passenger Cars; April 1-5, Trucks—Brooklyn. Brooklyn Motor Vehicle Dealers' Assn. I. C. Kirkham, Manager.

Third week March—Trenton, N. J. Trenton Auto Trade Assn. John L. Brock, Manager.

Probably February—New York. Automobile Dealers' Assn. Charles A. Stewart, Manager.

Probably March—Chicago. Chicago Automobile Trade Assn.

March—Philadelphia. Philadelphia Automobile Auto Trade Assn. A. L. Maltby, Manager.

March—Pittsburgh. Automobile Dealers' Assn. of Pittsburgh. John J. Bell, Manager.

March—Syracuse, N. Y. Syracuse Automobile Dealers' Assn. Harry T. Gerdner, manager.

March—Utica, N. Y. Utica Motor Dealers' Assn. W. W. Garabrant, Manager.

Late March or early April—Cleveland, Ohio. Cleveland Auto Show Co. Fred H. Caley, Manager.

April 5-12—Montreal, Can. Automobile and Used Car Exposition. T. C. Kirby, Manager.

Not decided—Bridgeport, Conn. Auspices of City Battalion. B. B. Steiber, Manager.

Not decided — Harrisburg, Pa. Harrisburg Motor Dealers' Assn. J. Clyde Myton, Manager.

Not decided —Hartford, Conn. Hartford Automobile Dealers' Assn.

Not decided—Indianapolis, Ind. Indianapolis Auto Trade Assn. John B. Orman, Manager.

Not decided—Kansas City, Mo. Kansas City Motor Dealers' Assn. E. E. Peake, Manager.

TRACTOR SHOWS

Feb. 10-15 — Kansas City, Mo. Fourth Annual Tractor Show. Sweeney Building, Kansas City Tractor Club. Guy H. Hall, Sec.

Feb. 18-22—Wichita, Kan. Annual Mid-west Tractor and Thresher Show, Wichita Tractor and Thresher Club. Forum.

CONVENTIONS

Dec. 16, 17, 18—Chicago. Convention, National Association of Automobile Accessory Jobbers. (Directors and Committees, Dec. 16; General Sessions, Dec. 17-18.)

Dec. 30-Jan. 1—Chicago, Ill. Twelfth Annual Meeting American Society of Agricultural Engineers. J. W. Dickinson, Secretary, Ohio State University, Columbus.

Jan. 12-14—New York. Meeting, Society Automotive Engineers.

Feb. 25-28 — New York. Sixteenth Annual Convention. American Road Builders' Assn.

Congress Deals with Price Fixing

Recommends Establishment of Government Agency to Abolish Evils

WASHINGTON, Dec. 8—The establishment of a Government agency by Congress is recommended by the Federal Trade Commission to abolish the existing evils of price cutting and price maintenance. An agency is to be organized which will maintain the records of commodities produced throughout the country together with the resale prices on them and which will review the resale prices and the terms of the contracts between the producer and the dealer.

If the prices and contracts are found agreeable it will mean that the dealer must abide by the resale price established. If the resale price and contract are not found satisfactory they will be adjusted between the Government agency, the producer and the dealer.

The object of this proposed agency is to protect producers of identified goods in their intangible property rights and good will, restrain price cutting, and also to curtail the unlimited power which manufacturers would have if they would legally be allowed to fix and maintain resale prices without regulation.

The Commission stated in its report that both price maintenance and price cutting under certain conditions are unfair. Up to this time the Commission has followed the letter of the law and prevented price maintenance, but it urges Congress to establish the agency, since price maintenance in some cases is justified, while wholesale price cutting is unfair in many instances and affords no protection to the producer. Following is the complete report made by the Federal Trade Commission to Congress:

The question is, whether or not a manufacturer of standard articles, identified either by trade-mark or trade practice, should be permitted to fix by contract, express or implied, the price at which the purchaser can resell them.

The question has been continuously before the Commission since its creation. It has been the subject of study, investigation and hearing and constantly recurs, in various forms, in complaints filed with the Commission by business concerns.

The Supreme Court has made it clear that, in the present state of the law, the maintenance of a resale price by the producer is a restraint of trade and is unlawful.

Such being the judgment of the Supreme Court, the Federal Trade Commission has enforced the law, even though it may have appeared to operate inequitably in some cases. In its enforcement of this rule, the Commission has been mindful that the cutting of a recognized resale price on well established and identified articles has been, at times, indulged in for unfair trade purposes. When so unfairly used, such price cutting is attempted to be cloaked as lawful competition and justified by the Supreme Court decisions.

Thus, both price maintenance, and price cutting under certain conditions are found to be unfair and business men are perplexed. It is with the desire that this perplexity may be terminated that the Commission addresses the Congress.

It is urged, and, the Commission believes, with reason, that it would be unwise to vest with the manufacturers of articles the right, without check or review, both to fix and to compel the maintenance of resale prices. It is true that business practice inclines producers to fix the lowest possible retail price in order to secure the greatest possible sale of their product, but in the complex commercial organism functioning between the production of an article and its final sale, for actual consumption, both the wholesale and retail merchants are entitled to just compensation for useful service performed.

It is similarly urged that manufacturers should be protected in their good will created by years of fair dealing and of sustained quality of merchandise.

The consuming public does not enjoy benefits by unfair price cutting to compensate it for the injuries following demoralization caused by price cutting. This for the reason that, in the long run, unrestrained price cutting tends to impair, if not to destroy, the production and distribution of articles desirable to the public.

There must be a common ground wherein the rights of producer, purveyor and consumer may each be fully secured and equity done to all. The search for such a ground has been a task of the Commission and results in the following conclusions:

(1) That producers of identified goods should be protected in their intangible property right or good-will.

(2) That the unlimited power both to fix and to enforce and maintain a resale price may not be made lawful with safety.

(3) That unrestrained price cutting is not in the public interest.

Bills now pending before Congress may well be made to meet the difficulties of the situation if amended to provide for a review of the terms of resale contracts and a revision of resale prices, by a disinterested agency.

Therefore, it is recommended that it be provided by law that if the manufacturer of an article produced and sold under competitive conditions, desires to fix and maintain resale prices, he shall file with an agency designated by the Congress, a description of such article, the contract of sale and the price schedule which he proposes to maintain, and that the agency designated by the Congress be charged with the duty, either upon its own initiative or upon complaint of any dealer or consumer or other party in interest, to review the terms of such contract and to revise such prices and that any data and information needful for a determination be made available to such agency.

Such legislation would seem to be in accord with the spirit of the times in that it is designed, by removing this perplexity, to promote the efficiency of manufacturing and commercial institutions and so to serve the interest of the consuming public.

—

Want $8,000,000 for Mail Trucks

WASHINGTON, Dec. 6—Assistant Postmaster General James I. Blakslee yesterday asked the House Postoffice Committee for an appropriation of $8,000,000 to carry on and extend the use of motor trucks in the mail service. The appropriation is asked for the year beginning July 1, 1919. This does not include purchase of trucks, as these will be turned over by the army without charge.

The rural parcel post made up of a fleet of thousands of trucks can lower the cost of farm produce by elimination of a large part of the cost of handling, Blakslee said. He illustrated this by showing that it costs 80 cents a ton mile to take goods from New York piers to the consumer, which is in many cases more than the original cost of the goods plus the ocean freight rate.

—

Restrictions on Iron Ore Imports Modified

WASHINGTON, Dec. 7—Restrictions previously placed on the importation of iron ore by ocean shipments has been modified to allow the importation of calcined spathic iron ore originating in and coming from England when shipped as back-haul cargo.

Dutch East Indies Offer Market

Far Eastern Division of Bureau of Commerce Points Out Opportunities

WASHINGTON, Dec. 6—The Dutch East Indies is recommended as an excellent market for American mechandise, and particularly automobiles, accessories and farm tractors, by the Far Eastern Division, Bureau of Foreign and Domestic Commerce, which states that there is a steady growth of American trade in the Indian markets. The import trade of the Island of Java, which contains 80 per cent of the population of the Dutch East Indies, expressed in guilders (equal to $0.402) for 1916 and 1917 included the following:

	1916	1917	Inc. in 1917
Automobiles and parts	5,600,000	8,200,000	2,600,000
Machinery, utensils and electrical apparatus	2,200,000	5,000,000	2,800,000
Tires, automobile and bicycle	750,000	1,300,000	550,000
Lubricating (mineral) oil	900,000	900,000	.....

The exports from Java to the United States in 1916 totaled 68,500,000 guilders as compared with 140,800,000 in 1917, an increase of 73,300,000. The trade was principally in rubber, tin, hides and spices, and was very profitable for the natives, which in turn resulted in the large imports of machinery, automobiles, and iron and steel products.

Territory of local agents in the Dutch East Indies should not be limited too narrowly, says the report. However, an agent making headquarters in Batavia is 2 days by rail from Surabaya and 3 days from Banyuwangu. Menado, the center of the Moluccas, is a 2-week steamer trip, and a trip around the Celebes requires 27 days.

For one agent to work the whole archipelago periodically would not only require his full time but prove exceedingly expensive. A branch office or district agency, therefore, in Batavia with authority over the whole colonial market would seem a practical solution. Such an office could establish sub-branches at all the principal centers, and in so doing take initial orders. It would subsequently collect and handle in a lump order from Batavia all outlying orders, at a great saving in cable charges, and the goods could be shipped direct to such branches and financed through its bank at Batavia, the branch distributing the shipment to its sub-agents.

Such a district agency would also save expense and time by acting as a clearing house for market reports from the manufacturer to the sub-agencies and could thereby answer every inquiry as to prices in short order from the latest information at its command. The advantages and economies of such a plan are particularly pertinent factors in successful marketing in this locality.

Aerial and Motor Truck Mail Service Development

Postmaster Burleson Indicates Enormous Expansion Within the Next Year in Report to President—Air Mail to Cuba and South America Forecasted

WASHINGTON, Dec. 6—That aerial mail, city motor vehicle, and parcel-post motor truck will be developed amazingly within the next year is the most important message in the annual report made by Postmaster General Burleson to President Wilson this week.

The report, which contains a complete summary of the work performed in the new air mail service, the parcel-post truck service, and the city motor vehicle service, forecasts extension of the aerial mail service between New York and San Francisco, Boston and Key West, Key West and Havana, Cuba, Cuba and Panama, and Key West via the West Indies to South America.

The Washington to Philadelphia route, it is stated, has performed as a working laboratory, and the experiences secured will insure perfection of the service in the contemplated territories. A 9-hour schedule will be maintained between Chicago and New York, as compared with the 21-hour railroad schedule, and similar time savings will be effected on all of the routes planned. Following is the report in full of the aerial mail service:

During the year there was created a new rapid medium of mail transportation through use of airplanes. This subject had been given considerable study and a number of spasmodic flights with mail had been undertaken by exhibition aviators, but it was not until the establishment of a regular and dependable aerial mail service between Washington and New York that transportation of mail by airplane became a permanent and practical feature of the Postal Service.

The aerial mail route between Washington and New York was inaugurated on May 15, 1918. One round trip daily except Sunday is being made without fail. The trip from Washington to New York is performed on an average of 2 hr. and 30 min., and from New York to Washington in 2 hr. and 50 min., the difference in time being due to the resistance offered by the prevailing winds, which are usually from a westerly direction. A stop for the exchange of mail on each trip is made at Philadelphia. An average of 7¾ tons of letter mail is being carried each month.

The cost of the operation of the service since it began, including development of new routes, is at the rate of $108,223.41 per year, or 79 cents per mile operated. The cost per ton-mile of mail carried is $5.35. By this service mail between New York and Washington is advanced from 2½ to 3 hours over the train service.

In addition to the airplane mail carried there is dispatched daily from Washington to New York letter mail from southern connections made up to carrier districts in New York City, which mail is thereby delivered to all parts of New York the same afternoon instead of the following morning.

The Aerial Mail Service was inaugurated with the co-operation of the War Department, which furnished the machines and aviators and conducted the flying and maintenance operations. This co-operation, which was of inestimable value, was maintained until Aug. 12, when the entire operation was taken over by the Post Office Department and the work performed by this department with its own equipment and personnel.

The task which the Army had undertaken was new and full of unsolved problems. A few flights in the beginning were defaulted, partially abandoned, or interrupted by stormy weather, but gradually the service settled down to an absolutely dependable one. It gives pleasure to report that the high standard of daily perfect flights which the Army succeeded gradually in establishing is being maintained by the Post Office Department regardless of weather conditions.

The following table summarizes the first four and a half months' operation of this service:

Month	Miles flown	Pounds of mail	Cost of service	Cost net mile	Cost per ton-mile	P.C. of per-formance	Forced landings	Time in air Hr.	Min.	Average speed Miles
May (15 days) ..	5,324	4,749	$3,682.11	$0.69	$8.15	76.78	4	78	16	68.02
June	10,640	13,081	9,922.71	.93	7.12	93.00	8	151	22	70.29
July	11,720	16,967	10,001.46	.89	5.43	92.59	8	156	34	74.86
August	11,894	16,558	9,555.67	.80	5.24	99.07	3	159	24	74.61
September	11,753	15,200	7,421.83	.63	4.01	100.00	3	156	9	72.69
Total	51,331	66,555	40,583.78	.80			26	701	45	72.57
Aver. per month.	11,407	14,790	9,018.61	.79	5.35	92.28	5 7/9	155	57	72.56

The foregoing is the cost of operating the New York-Washington route. To ascertain the total cost of the Aerial Mail Service add $2,216.91, the cost of preliminary work on the New York-Chicago route to be inaugurated this winter. The marked reduction in cost of the New York-Washington route for September was due to temporary withdrawal of operatives in connection with establishment of the New York-Chicago route.

The Washington-New York route has served as a working laboratory in which the many unknown factors that enter into the maintenance of a daily aerial service are being successfully solved, and the Post Office Department only awaits the day when the aircraft production of this country can more than supply the needs of our own Army and those of our allies to make effective the program for the aerial mail that I have directed to be put into operation as speedily as war conditions will permit.

This program directs, first, the establishment of an aerial mail service connecting the principal commercial centers of the country by a system of trunk lines and feeders, and, secondly, connecting this country with the West Indies and Central and South America. The trunk lines and feeders decided upon under this program are:

1. New York to San Francisco, with feeders from:
   (a) Chicago to St. Louis and Kansas City.
   (b) Chicago to St. Paul and Minneapolis.
   (c) Cleveland to Pittsburgh.
2. Boston to Key West, with feeders from:
   (a) Philadelphia to Pittsburgh.
   (b) Washington to Cincinnati.
   (c) Atlanta to New Orleans.
3. Key West, via Havana, to Panama.
4. Key West, via the West Indies, to South America.

In this program I have to report progress as follows:

1. Boston to Key West.—Of this route the Washington-New York division has been operated since May 15 and is functioning perfectly.

The Boston-New York division has been tentatively laid out and will be established whenever, in the opinion of the War Department, its operation will not conflict with the war needs of the country.

The Washington-Atlanta and Atlanta-Key West routes are now being worked out with a view to their immediate establishment at the close of the war.

2. New York to San Francisco.—Of this route the division from New York to Chicago has been carefully worked out. The War Department, under act of Congress of July 2, 1918, has released to the Post Office Department, for the use of this division, airplanes of 650 lb. mail-carrying capacity which are no longer suitable for war needs. The hangars have been ordered, landing fields obtained, and the route has been ordered established before the close of the present year.

In a series of airplane flights by the Post Office Department early in September the route was carefully charted for emergency and regular landing fields. In this work one airplane made a record flight from Chicago to New York in less than 14 hr., including all stops en route. The flights were made through storm and heavy rains over parts of the route.

The reconnaissance developed that it will be feasible to maintain a daily 9-hr. schedule between New York and Chicago, as compared with the 21-hr. schedule of the Twentieth Century Limited. The New York-Chicago schedule for the present will call for departing from New York at 6 a. m. and arriving at Chicago about 3 p. m., thus connecting with all city deliveries. The principal mail stop will be Cleveland.

The time between Chicago and Cleveland will be cut to 3 hr. 45 min., and between New York and Cleveland to 5 hr. and 15 min. Mail from the Atlantic seaboard will be advanced from 12 to 24 hr. to the West and Southwest by this new service. The feeder routes from Chicago to St. Louis, Kansas City, St. Paul, Minneapolis and the remainder of the trunk line from Chicago to San Francisco will be worked out during the ensuing year with a view to their immediate inauguration at the close of the war.

3. Key West to Panama, and

4. Key West to the West Indies and South America.—Negotiations looking to the conclusion of special aerial mail conventions between the United States and the foreign countries involved for the establishment of these routes to the West Indies and Central and South America are now in progress. It is realized that these oversea routes will require the most powerful airplanes with wireless installation and special construction to make them safe over the seas, but the enormous commercial advantage that will result by materially reducing the time between this country and Central and South America will jus-

tify the expenditure that such a service will entail.

In the conduct of the service now in operation and the preliminary work on the routes to be established immediately upon the termination of the war, the Post Office Department is receiving whole-hearted support from the War Department, Navy Department, National Aeronautical Advisory Board, Bureau of Standards, Weather Bureau and Geodetic Survey, besides much local assistance from committees, individuals and aero clubs in this country.

Postal receipts from eight parcel post motor truck routes operated from Jan. 1, 1918, to June 30, 1918, totalled $204,198.39, an average of more than $25,524.71 per route, with a total annual earning rate of $51,049.59 per route, according to the report on the parcel post motor truck service. These earnings, it is pointed out, were exclusive of the important benefits such as the increased production and distribution of food, the elimination of intermediate cost of handling between producers and consumers, and the facilitation of the collection and forwarding of produce and merchandise. There are 150,000 miles of important highways now available, states the report, for truck line routes, and it is expected that thousands of military trucks will be used over these routes, which average 50 miles each and provide use for 30,000 trucks.

Following is the complete report on the parcel post service:

After the receipt of proposals that were considered exorbitant or unreasonable during the period, Dec. 1, 1917, to June 30, 1918, eight motor vehicle star routes were established between important market centers as government-owned vehicle routes and the cost of their operation was paid from the appropriation for the inland transportation of the mails by star routes.

These routes are designed primarily to promote the conservation of food products and to facilitate the collecting and forwarding of produce and merchandise, as well as any other matter admissible to the mails as parcel post, thereby affording a means of bringing the producer into immediate touch with the consumer, and eliminating intermediate cost of handling, thereby reducing cost to the ultimate consumer by making more accessible the productive zone in the vicinity of large cities.

By the use of such conveyances one man can perform as much service in a day as four average producers could under former methods, thus meeting to an extent loss occasioned by many farmer-producers who were diverted to occupations incident to the prosecution of the war.

During the six-month period, Jan. 1, 1918, to June 30, 1918, the postal receipts from these eight routes were $204,198.39, an average of $25,524.71 per route; a total annual rate of earning of $408,396.78, or an average annual rate of earning per route of $51,049.59. The total expenses were $41,110.08, an average cost per route for the period of $5,138.76, and an average cost per route of $10,277.52. The average net profit per route for the period was $20,386.04, an average annual rate of profit per route of $40,772.08. The average earning per mile of travel was $0.1568 and the average profit per mile of travel was $0.6232.

The act making appropriation for Postal Service for the fiscal year ending June 30, 1919, having provided a specific appropriation with which to conduct experiments in the operation of motor vehicle truck routes, the expenses of operating the eight existing routes previously operated under the appropriation for the inland transportation of the mails by star routes is now paid from the specific appropriation.

While a portion of the revenues derived from mail matter carried on these routes, particularly transit mail, should properly be credited to other branches of the service, yet due to the fact that a quicker dispatch and more direct and expeditious delivery can be effected, patrons are expressing a preference for this service in forwarding mail matter of all classes; hence a considerable portion of the revenues should properly be credited to the motor vehicle mail service.

Owing to the experimental nature of the motor vehicle truck service, it was deemed best to await the stabilization of the service before discontinuing other existing mail routes or mediums of supplying mail which it could supplant; hence the economies effected in this direction are not as great as they otherwise would have been.

However, during the period, Dec. 1, 1917, to June 30, 1918, an annual saving has been effected of $4,478.12 by the discontinuance of star railway mail service, mail messenger and electric car service, which it has superseded.

A total number of 105 trucks is required to serve the patrons of routes already established.

A standardized truck has been adopted for use on these routes, which is also adapted for use in all mail branches of the Postal Service, and four of these trucks have been constructed and are ready for delivery.

As provided in section 8 of the current appropriation act, the War Department has turned over to this department the chassis of two Army trucks, type AA, and they are now in service. A further extension of this service will provide use for a large number of vehicles when no longer necessary for military purposes, and other chassis will be supplied by the War Department, no doubt, from time to time.

An essential feature of this service is the commercial convenience of all the patrons, supplying them with data and information concerning points where they can secure the best products and commodities at the least cost. Postmasters at offices on the routes are reporting to the department each week the local retail prices received by farmers and producers for their commodities. These data are compiled and disseminated through the public press weekly.

In the light of this experience, it is proposed to establish through or trunk-line routes of an approximate length of 50 miles each—to connect one with the other—extending out from the larger consuming centers, through productive territory contiguous to such centers and removed from direct established lines of transportation, and to then connect with the trunk-line routes lateral or feeder routes. There are, approximately, 150,000 miles of improved highways now available for trunk-line routes, and several thousand localities in which lateral or feeder routes in productive territory can be operated throughout the year.

There is an insistent demand for increased food production and a necessity for a more reliable means of intercommunication for the transportation of commodities, particularly food of local origin or production, and merchandise and implements incidental to food production.

The commercial and economic advantages of this service are so evident that its extension would seem to be desirable.

The efficiency of government-owned motor vehicle service in the cities over the contract method, states the report, has been demonstrated many times in the recent experiments made by the government. The service in operation in Boston, Brooklyn, Buffalo, Chicago and many other cities, controlling a total of 1004 trucks, ranging from ⅜-ton to 3½-ton, has been both efficient and profitable. The efficiency of the service has been so remarkable, says the report, that even express companies transport packages between two points by the local parcel post motor vehicle mail service for the ultimate delivery of the expressed parcels.

This service, which has been extended gradually, states the report, is operated in Boston, Brooklyn, Buffalo, Chicago, Detroit, Indianapolis, Nashville, New York, Philadelphia, Pittsburgh, St. Louis and Washington. It employs 1200 mechanics, chauffeurs, garagemen and clerks.

It has been instrumental in creating a coalition of all of the work of the Postal Service, making a directly connected collection, distribution and transportation system which was not possible under the old contract system.

The contract system in the larger cities also developed a constant friction between the contractor and the local postal officials which is now completely eliminated and which has been replaced by harmony and co-operation. It should be understood, says the report, that the charge against the appropriations for vehicle service for the fiscal year during which the service is installed in any office is usually in excess of the amount saved, due to the fact that the entire purchase cost of the fleet of trucks is charged against the current appropriation and the full economies cannot be secured until after four years of operation. Furthermore, many of the economies, adds the report, cannot affect other appropriations which under the law cannot be called upon for re-imbursement.

May Drop Return Loads Plan

BOSTON, Dec. 7—With the practical dissolution of the Massachusetts Committee of Public Safety, which was to have contributed $2,000 toward the establishment of a fund to put into operation a Return Loads Bureau, it looks now as if that scheme was dead as far as the Bay State was concerned. The motor truck dealers made an investigation and recommended that a bureau be established and $1,000 was pledged to aid the work. The Boston Chamber of Commerce also investigated the matter thoroughly and reported favorably and planned an appropriation of a similar amount, and to have headquarters in its buildings. The Massachusetts Committee on Public Safety felt that it was a necessity, too, and its officials were willing to contribute $2,000. The details were being worked out by a committee on transportation at the Chamber of Commerce. Now without the support of the state funds, which will not be available unless the Governor and his council authorize such an expenditure, the future looks dubious.

Milwaukee Show Jan. 24-30

MILWAUKEE, Dec. 9—The dates of Jan. 24 to 30 have been selected by the Milwaukee Automobile Dealers, Inc., for the eleventh annual Milwaukee show, to be held in the Auditorium. At a special meeting of the association, following the return of Manager Bart J. Ruddle from the conference of show managers in Cleveland, the action taken shortly after hostilities ceased to proceed with the 1919 show was ratified and confirmed.

Reo Annual Report Very Satisfactory

Total Assets Show Increase of Over $1,300,000 as Compared With Last Year

DETROIT, Dec. 5—The annual statement of the Reo Motor Car Co. for the fiscal year ending Aug. 31 shows a surplus of $5,494,828, as compared with $4,645,915 for 1917. The total assets show an increase of over $1,300,000, as compared with 1917, while the current assets compare with $8,836,922 for last year, an increase of over $1,500.000. Considering the general conditions and the great reduction in the production of normal products, the balance of the company is considered most satisfactory.

BALANCE SHEET REO MOTOR CAR COMPANY

Assets

Current assets		$10,460,231.69
Cash on hand and in banks		405,325.86
Receivables, misc.	$1,537,310.85	
Less reserve	65,227.76	
	$1,472,083.09	
Due on Government contract	1,811,245.52	
		3,283,328.61
Inventories		6,771,550.22
		$10,460,231.69
Capital assets		$5,229,537.80
Land		237,205.18
Buildings		1,364,070.81
Machinery and equipment		3,592,261.81
		$5,229,537.80
Deferred charges		$21,825.40
Interest in branches		78,787.50
		$15,790,382.39

Liabilities

Current liabilities	$3,358,304.21
Notes payable	1,250,000.00
Accounts payable	1,700,899.81
Accrued pay roll	122,826.55
Reserve for taxes, etc.	284,577.85
	$3,358,304.21
Capital	$12,432,078.18
Capital stock authorized	10,000,000.00
Less unissued	3,062,750.00
Stock outstanding	$6,937,250.00
Surplus	5,494,828.18
	$12,432,078.18
	$15,790,382.39

—

More Oil from Texas

AUSTIN, Dec. 8—An enormous increase in oil refining facilities in Texas will be provided within the next few months. This is assured by the many new projects of this character which have already been decided upon. It is interesting to note that practically all of the new refineries now under construction or in early prospect in the Central West Texas fields belong to the smaller independent oil producers. The larger operators are financially able to lay pipe lines and the site of their refineries are for the most part some distance away from the producing fields.

The product of the Central West Texas fields is of a much higher grade than that of the fields of the Gulf coast region and this accounts for the remarkable strides that are being made in constructing refineries for handling the more valuable oil. Instead of locating their refineries in the producing territory, the larger companies are arranging to pipe the product to Fort Worth, Dallas, Houston and Galveston, where it will be put through the refining process. More than a dozen new small refineries are to be built by independent operators at various points in the Central West Texas fields within the next few months.

—

Texas Has 250,201 Vehicles

AUSTIN, Dec. 8—It is shown by the records of the State Highway Commission that a total of 250,201 motor vehicle licenses were issued in Texas up to Dec. 1, 1918. Of this number 3250 were for motorcycles. There are a total of 4188 motor vehicle dealers in the state.

—

Starters for Lauson Tractors

NEW HOLSTEIN, WIS., Dec. 8—The John Lauson Mfg. Co. has placed a contract with the Christensen Engineering Co., Milwaukee, for Christensen starters with which all Lauson farm tractors will hereafter be regularly equipped. The Christensen starter differs from other starting devices heretofore put on the market in utilizing the "carburetion principle" instead of electric or air systems. The Lauson is the first farm tractor, so far as known, to be regularly equipped and sold with other than an electric starter.

—

More Money for Auto Body

LANSING, Dec. 9—Stockholders of the Auto Body Co. have authorized $600,000 of new preferred stock, of which $500,000 will be issued at once. This will be 6 per cent cumulative.

—

Cultivating Japanese Automotive Field

(*Continued from page* 1012)

tariff automobile parts pay a duty of 25 per cent ad valorem, whereas the general rate on such parts is 30 per cent ad valorem.

The listing of vehicles is clear and there is rarely any conflict on interpretations, although there was some time ago an importation of tractors which was passed as farm machinery at a reduced rate of duty. This classification was confirmed after the matter had been contested in court. The Japanese word covering all motor propelled vehicles is "jidosha," meaning literally "self-propelled vehicle," and it was on this construction that the case was contested and lost by the customs authorities. Attention has also been called to a case wherein chassis were admitted as parts, in view of the fact that they were not fitted with bodies, but it is doubtful if this interpretation will be upheld.

Advertising matter may be packed in shipping cases with automobiles, and if in black and white will be admitted without duty, but if lithographed in colors is subject to duty. Pictures are also dutiable. Advertising matter shipped separately is governed by the same restrictions.

Definite Program for Snow Removal

Highways Transport Committee Asks Co-operation from Various State Committees

WASHINGTON, Dec. 7—The Highways Transport Committee in forming a definite program for snow removal this winter from the various highways has addressed the different State Council of Defense Transport Committees asking them to give immediate attention to the following subjects:

Of the powers of the State Highway Department or Commission for removing snow. If such powers are not specifically covered by statutes whether maintenance funds can be used in an emergency?

What co-operation and work can and will be undertaken by the counties and States?

What co-operation and work can and will be undertaken by the municipalities and State?

What preliminary measures can be undertaken which will prevent the drifting of snow, such as location and erection of snow fences? Also, the change of rail, board, picket and hedge fences which check the currents of air during a snow storm, thus causing drifts to form, and removal of brush or weeds paralleling the road, which invariably cause drifts to form.

Highway Department's Attention Called

Attention by State Highways Department or Commission, through its field organization and in co-operation with the State Highways Transport Committee, of physical conditions along the highways tending to cause drifts. Recommendations as to the best means of dealing with same by preventive methods.

The making of snow removal reports of every snow storm on such highways as are designated to be kept free from obstruction by snow so as to allow continuous essential highways transportation.

Letters have been sent to the Transport Committees in Massachusetts, Maine, Vermont, New Hampshire, Rhode Island, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, Ohio, Indiana, Kentucky, Michigan, Illinois, Wisconsin, Minnesota, Iowa, Missouri, Kansas, Nebraska, South Dakota, North Dakota, Colorado, Wyoming, Montana, Idaho, Washington, Oregon, California and Nevada.

Continuous Truck Movement Needed

The Highways Transport Committee realizes that there will be great need for continuous motor truck movement this winter to assist in the distribution of foodstuffs from farm to mill and mill to seaboard or farms to seaboard, and consequently has asked the regional, State, district and county organizations to leave no stone unturned in facilitating this work.